DOCTORAL THESIS

Coping Strategies of Project Managers in Stressful Situations

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Coping Strategies of Project Managers in Stressful Situations

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Abstract

Today the world is increasingly complex and fast paced, fuelling the potential for stressful situations to emerge and engulf individuals across all aspects of life. Stress is emerging as a prevalent affliction of the workforce and is extremely costly to individuals, organisations and economies. Understanding how individual's cope with stress is the first stage in developing effective programs for mitigating the risks associated with a particular work environment. Projects are fast emerging as one of the preferred methods of working for both individuals and organisations. Projects with their unique product and constraints of time, cost and quality are concentrated environments in which stress can manifest and potentially cause damage.

Project management brings with it a specific culture of identify, plan, action. This culture is embodied in the project management processes both at the individual and organizational level. This thesis explores the relationship between the selection of coping strategies by project managers when dealing with three (3) types of stressor, work, home and personal health and the culture of project management. This study provides the first empirical research on how project managers cope with stress and how this coping strategy selection is influenced by their sense of control and their emersion in project management culture.

Analysis of responses from 216 project professionals from over 30 countries in this study show that project managers consistently use more Planning and Active Coping strategies when attempting to cope with all three kinds of stressful situations, work, home and personal health. The use of Planning and Active coping are positively correlated to the application of project management skills. Results suggest that the more project management skills are applied to their work the more likely they are to use Planning and Active coping to manage stressful situations. Further analysis shows that this correlation also has some low levels of predictability for the use of Planning and Active coping. Not only is the use of project management skills associated with a higher level of Planning and Active coping strategy selection but that use of project management in the workplace is a predictor of a higher level of both coping strategies.

In addition to these two coping strategies project managers consistently use Acceptance as a means of coping across all three domains.

The results indicate that there is a consistency in how project managers choose to cope with stress across their life with a moderate relationship to the culture of project management. The influencing factors that determine this consistency are unclear from this study however the consistency is unique with most general studies on coping finding no consistency in selection of coping strategies across work, home and personal health. The outcomes of this research provide a foundation for understanding how project managers attempt to cope with stress which will inform and improve the ways in which organisations attempt to support project managers in their stress management.

Declaration

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of *Doctor of Philosophy*. This thesis represents my own original work towards this research degree and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made

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1 INTRODUCTION

1.1 Purpose of the research

Today the world is increasingly complex and fast paced, fuelling the potential for stressful situations to emerge and engulf individuals across all aspects of life. Stress and its impact on the individual and the organisation are of paramount importance. The cost of stress, as reported in the Health Safety Executives Stress-related and psychological disorders report (HSE, 2009a), to the UK economy is estimated at £12 billion per annum with 442,000 people reporting they experienced work related stress to the level of making themselves ill with a corresponding estimated 13.5 million lost working days due to these work-related conditions according to the Labour Force Survey (LFS) (HSE, 2009b, 11). In Australia "stress-related compensation claims nearly doubled from 1990 to 1994. In NSW alone, the cost of stress claims rose from $5.6 million in 1990 to $35.7 million in 1994, and by January 1998 it had risen to $60 million per year" (PwC, 2008). Medibank Private's study into workplace stress reported the annual cost to the Australia economy from stress related presenteeism and absenteeism was $14.81 billion with the direct cost to employers being $10.11 billion (MedibankPrivate, 2008). Canada reports similarly alarming figures with an estimated $35 billion per annum lost to stress related health issues such as mental health and substance abuse (Tangri, 2002, 5). The American Institute of Stress (AIS) estimates the cost of stress to the US economy at $300 billion per annum from a combination of accidents, absenteeism, employee turnover, diminished productivity, direct medical, legal, and insurance costs, workers' compensation awards as well as tort and Federal Employer's Liability Act (FELA) judgments (AIS, 2004). The cost of stress to individual organisations is challenging to measure, however Tangri (2002) estimates that the cost of stress to an organisation can be calculated using the following as a guide;

- 19% of absenteeism
- 40% of turnover (the cost of turnover is 150-250% of the salary benefit envelope for each position)
- 55% of Employee Assistance Program (EAP) programs
- 30% of short-term disability and long-term disability costs
- 10% of drug plan costs to cover psychotherapeutic drug costs
- 60% of the total costs of workplace accidents

- the total cost of workers' compensation claims and lawsuits due to stress

Brun and Lamarche (2006) developed a complex model for cost of stress assessment for individual organisations based on a set of baseline data, absenteeism and presenteeism costs. Although they report that the availability of the data required in each organisation is variable and the accuracy again uncertain the figures calculated and reported are undeniably high and significant enough to warrant the high levels of interest from academics. Additionally, the context within which stress occurs and how individuals attempt to cope with stress is an important component of being able to adequately manage stress to negate maladaptive outcomes. The situation specificity of stress and coping is further explored in Chapter 2 below.

Projects as a way of doing business has been emerging throughout the latter half of the 20th century (Turner and Keegan, 1999) as one of the preferred models of driving change within organisations across a multitude of industries. Projects are a dynamic and often fast-paced mode of operation with the constant balance of time, cost and quality, the constant alignment and realignment to organisational strategy as well as managing the benefits delivered throughout and beyond the life of the project. Projects involve unique endeavours that challenge us to explore new ideas, test old ones and generate solutions that are taking the project manager and their team members into the unknown. Although it is the excitement that draws many project managers to the field, projects are also highly stressful environments. Asquin, Garel and Picq (2009) explore the risks to individuals who choose to work in projects and although the data is limited to a small sample and not generalisable they identified a number of potentially devastating psycho-social outcomes of project generated stress. To complicate the matter further, there is the issue that not all stress leads to negative outcomes and thus the removal of all stress is not the ideal solution. A lack of stress can lead to "rust out" which can lead to the same level of maladaptive outcomes as "burn out" from too much stress. The solution rests between the adaptive and the maladaptive outcomes. Sommerville and Langford (1994, 234) in their study on the multivariate influences on the people side of projects: stress and conflict state that *"either of these situations may lead to distress, whilst a healthy level of stress, eustress, may achieve an appropriate unification between the individual and his/her lifestyle."* The rest of this chapter explores the concepts of projects and project

management in more detail. The premise for this thesis was borne out of the notion that projects are inherently stressful with their constant demands for balancing time, cost, scope or work and quality and as such present a constant need for project managers to cope with stress arising from this situation. Although the Labour Force Survey takes a detailed look at the stress and health related outcomes including a by industry sector and by profession view, project management is not featured and there are no similar categories that can be used as substitutes. This study examines the specific context of project management and stress management by project managers as no other studies have done so before.

Beyond the boundaries of the work environment, socio-economic and demographic changes to the workforce have blurred the lines between work and personal stress. Over the past few decades these changes have included an increase in the number of women in the workforce, a rising divorce rate and subsequent single parent households and a rise in the number of working mothers in both full and part-time employment (Perry-Jenkins et al., 2000). Together with these issues economies around the world through the 1990's and early 2000's boomed and employment was at an all time high in many of the industrialised nations making the issue of staff attraction and retention a critical factor. Although there have been drastic changes in economic stability as a result of the much discussed Global Financial Crisis which saw the complete reverse of fortune, the pressure on organisations to manage and retain the staff they do have is still of importance. With less free floating funds to push projects through and the reduction in staff numbers as well as the stress of uncertainty within families, the risk associated with badly managed stress for project managers is as high as ever. These changes have lead to the emergence of a new challenge for industry and a popular area for research of *work-family balance* (Chan et al., 2000, Gryzywacz et al., 2002). Organisations are no longer able to consider only the stress that is directly associated with work but must now ensure that they are acknowledging, if not yet actively managing, the whole of life issues which their staff are dealing with that may impact their job satisfaction and productivity.

This study seeks to explore this established and costly societal issue through the specific lens of project management to understand how the culture of project management influences the cognitive process of coping across the multiple life

domains of work, home and personal health. The importance of this topic is underpinned by the growing emergence in project management standards of stress management and the requirement for project managers to demonstrate they understand and apply stress management techniques (PMI, 2007, International Project Management Association, 2006). However there is very little research available to guide the project management community on what actions to take and how effective they will be. Understanding how project managers cope with stressful situations is the first step to being able to manage the outcomes, both positive and negative.

1.2 Methodology

This study is a quantitative analysis of the coping strategies of project managers. Data was collected using a web-based questionnaire. The majority of measurement items were derived from proven self-assessment tools developed and tested for internal consistency and factor structure by other researchers. The decision to use proven tools was taken to increase the accuracy and validity of the data captured for this study. Participants were sourced through organisations known to the researcher or through project management associations. Consenting organisations willing to invite 5 to 20 of their project managers to participate were provided with login instructions and asked to email their project managers requesting their participation. Individual candidates were informed of their right to refuse participation, confidentiality of results and that they would be provided with a personalized development plan for their project management skills if they chose to participate.

A pilot was run collecting a sample of N=79 to trial the selected assessment instruments. As a result of this pilot, modifications were made to the individual project management competence assessment instrument and the primary appraisal and perceived control scales. The coping strategy assessment, the Brief COPE was run in its dispositional format with the data from the pilot being used to test hypothesis 01 of this study.

The full data capture was conducted with over thirty (30) participating organisations resulting in a final sample N=216. No control sample was used for the majority of measures. This research design is common in psychological research into stress and

coping of particular groups. Discussion has focused on the difference between other types of samples and the findings from this study's project manager sample. A global database combining the results of several previous studies conducted using the Generalised Self Efficacy (GSE) measure was used as a comparator sample, providing a "general population" perspective.

Fourteen (14) hypotheses were generated based on six (6) research questions.

1. What are the dispositional coping strategies used by Project Managers in stressful situations?
2. What are the coping strategies used by Project Managers in specific stressful situations?
3. What role does perceived control have in the primary appraisal component of the coping process for project managers?
4. What role does perceived control have in the secondary appraisal component of the coping process for project managers?
5. What is the overall effect of control on coping strategy selection?
6. What relationship does project management culture have with the coping strategy selection for project managers?

Univariate analysis was conducted on all three data sets, pilot, full data and global GSE. Bivariate analysis was conducted using Pearson correlations and standard regression analysis. ANOVAs and t-tests were used to test the predictive capability of control and project management culture as independent variables.

1.3 Findings

The findings from this thesis explore the relationship between the use of project management in the workplace and the subsequent selection of coping strategies by project managers when dealing with stress at work, at home and with their personal health. The findings are intended to inform the project management community on how project managers are attempting to cope with stress throughout their life as a basis for developing methods of stress management. The findings demonstrate that project managers are consistent in their selection and application of coping strategies

when dealing with stressful situations across the three (3) life domains of work, home and personal health.

Overall the findings from this study support the notion that project managers are consistent in their approach to managing stress and their chosen pathways are related to the nature of the work they perform through project management. For organisations looking to assist their project managers ameliorate the negative effects of stress the foundation point for stress management programs can now be based on the understanding that project managers will instinctively try to plan and deal directly with their stressful encounters.

1.4 Structure of the thesis

Chapter 1 of this thesis provides an overview of the study including purpose, methodology and key findings.

Chapters 2, 3 and 4 contain the literature review as this thesis straddles two (2) significant schools of learning, project management and psychology. Within the field of psychology, two (2) major areas of study, coping and control, are central to the hypotheses of this study. The literature review has been divided into three (3) chapters to provide a clear representation of the key areas underpinning this study.

Chapter 2 provides a comprehensive analysis of the theory and research associated with project management, projects, project manager competence and organisational project management maturity.

Chapter 3 presents the evolution of theories of stress and coping including the theoretical framework adopted for this study, the Transactional Theory of Coping. Also explored in this chapter are the types of coping strategies and the concepts of situational versus dispositional coping. This chapter includes an analysis of the research conducted to date on the validity and appropriateness of the available assessment instruments for coping.

Chapter 4 includes an analysis of the key psychological constructs of control including locus of control, perceived control and self-efficacy. This chapter also explores theories of adaptation from stress management based on control (or perceived control) and other psychological functions. Finally this chapter includes an analysis of the research conducted to date on the validity and appropriateness of the available assessment instruments for control.

Chapter 5 outlines the research questions and hypotheses tested in this study. It includes a detailed description of the methodology used to collect and analyse the data. The use of pilot data and other sources of research data are discussed.

Chapter 6 contains the detailed analyses of the data collected. The analysis includes univariate analysis on the pilot data, the full sample collected for this study and the control sample database for Generalised Self Efficacy. Bivariate analysis is conducted using Pearson correlations and regression analysis. ANOVAs and t-tests are used to explore the potential causal relationships between project management culture, control and coping strategy selection.

Chapter 7 presents the findings for each of the fourteen (14) hypotheses. Each hypothesis is restated with a summary of the findings for each discussed. Summary conclusions are presented. Limitations and future research directions are discussed.

2 PROJECT MANAGEMENT CULTURE

2.1 Introduction

This thesis investigates the effect of acculturisation by project managers to the culture of project management and specifically the effect of using project management at work on their coping strategy selection in managing stressful situations at home, with their personal health and in the workplace. Originally the term *acculturisation* "applied only to the process concerning a foreign culture, from the acculturing or accultured recipient point of view, having this foreign culture added and mixed with that of his or her already existing one acquired since birth" (American Psychological Association, 2007, 5). Acculturation differs from enculturation in that enculturation is the learning and adoption of a first culture while acculturisation is the adaption of a first culture due to the effects of a second culture. The term acculturation has predominantly been used by anthropologists exploring the effect of a dominant culture on a minority group, looking at how the culture of the minority group evolves with exposure to the new dominant culture (Harper, 1975, Baldassini and Flaherty, 1982, Ramos-Sánchez et al., 1999, Jenkins, 2000, LoCastro, 2001, Rodriguez et al., 2002, Bethel and Schenker, 2005, Brown et al., 2007, Viruell-Fuentes, 2007, Wamwara-Mbugua et al., 2008, Ho, 2010). The use of the concept of acculturisation as a means of understanding behaviour and culture change within a corporate environment is increasing, with research being conducted into areas such as creating more entrepreneurial or more technologically savvy cultures (Muzyka et al., 1995, Pan et al., 2008) and mixing different national or organisational cultures post acquisition (Komisarof, 2009, Sarala, 2009). Although the term *acculturation* has not yet been used directly in research into the influence of the work environment on individual or group psychology, the broad definition of acculturation as "the exchange of cultural features which result when groups come into continuous firsthand contact"(American Psychological Association, 2007, 1) is an excellent description of the work conducted by Kohn and Schooler (1983) into the effects of the work environment on psychological functioning. Kohn and Schooler investigated the effect of job conditions; organisational locus, occupational self direction, job pressure and uncertainties, on twelve psychological functions. Kohn and Schooler's job conditions represent the cultural features of a particular work place.

Culture can be defined in many ways and is used in many differing contexts. Within the context of this study culture can be defined as "the system of shared beliefs, values, customs, behaviours, and artifacts that the members of society use to cope with their world and with one another, and that are transmitted from generation to generation through learning" (UManitoba, 2010). Further to this, "culture is observable only in the form of personal behaviour but can be abstracted from individuals' actions and attributed to the social groups to which they belong" (UManitoba, 2010). Within the specific context of organisations Cooke-Davies defines organisational culture as "an indefinable force that shapes the way people in the organisation think and schools the way they behave" (Cooke-Davies, 1998, 1). Thus culture and specifically project management culture cannot be measured and assessed directly as a single construct. It must be viewed through personal and organisational behaviour which act as a proxy measure for project management culture. In this study the culture of project management is investigated across two key factors, (a) individual project management competence and (b) organisational support for project management as represented by organisational project management maturity. It is hypothesised that the acculturation to the problem solving and planning culture of project management will result in a positive correlation between project management culture (as represented by individual project management competence and organisational project management maturity) and the selection, by project managers, of problem-focused coping strategies when managing stressful situations at home, work and with personal health issues. The following sections of this Chapter explore the concepts of what constitutes a project (section 2.2), project management competence for individuals (section 2.3) and project management maturity models (section 2.4). Chapter 3 explores the concepts and theories of stress and coping while Chapter 4 deals with the notion of control and its possible effect on the coping process.

2.2 Projects

The Project Management Institute (PMI), defines projects as temporary undertakings used to create a unique product, service or results (PMBoK®Guide, 2008, 5). In the context of projects the PMI defines the use of the word *temporary* to mean that all projects have a definite beginning and end and that the project reaches the end when

either the objectives have been met or it becomes clear that it is not possible to meet the objectives. “Temporary” does not reflect or define the duration of the project.

The PMI combines the concepts of temporary with that of being *unique* in the *PMBoK®Guide* under the process of *“progressive elaboration”* (PMBoK®Guide, 2008, 7). The PMI views the nature of projects as being continually evolving. As the project unfolds and the project team understands the product being developed in more detail the product is able to be defined in more explicit terms. This process is an iterative one. As information is gained about the project, product or environment it is fed back into the system and changes are made to the product definition or development process. This loop is continuous until the project reaches its end.

Meredith and Mantel define projects as “a specific, finite task to be accomplished” (2009, 9). They also emphasise the fact that projects can be of any duration as long as the project is seen as one unit. They expand their definition of a project by the description of a number of attributes that the project possesses. These attributes include, purpose, life-cycle, interdependencies, uniqueness and conflict.

The Office of Government Commerce (OGC) defines a project within the PRINCE2 framework as

> “a temporary organisation that is created for the purpose of delivering one or more business products according to an agreed Business Case” (OGC, 2009, 3)

The OGC goes on to distinguish a project from the work of business as usual on five key points: change (projects are a means by which we implement change), temporary (once the change is implemented the project ceases to exist), cross-functional (involving multi-disciplinary teams from across the organisation), unique and uncertain. In relation to cross-functionality the OGC states that “this frequently causes stresses and strains within organisations and between, for instance, customers and suppliers” (OGC, 2009, 3). Project Management is defined as the “planning, delegating and control of all aspects of the project” with the role of the project manager being to plan the way forward from problem/project creation through to problem resolution/project delivery (OGC, 2009, 4).

Turner and Müller (2003) explore the very nature of the definition of a project through the multiple lens of the project

- as a production function;
- as a temporary organisation;
- as an agency for change;
- as an agency for resource utilization; and
- as an agency for uncertainty management

Their analysis concluded in a new definition of a project

> *"A project is a temporary organisation to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change."* (Turner and Müller, 2003, 3)

These definitions of projects provide the foundation for the theory posited in this thesis, that projects are unique problems to be solved and that project management culture is one of problem solving and planning. To achieve success project managers must attack the problem directly, seek out solutions and plan a way forward to implement the chosen course of action. As with coping with stressful situations (expanded on in Chapter 3) problems or projects in the workplace often require more than one type of solution and in some instances many solutions may be tried until success is obtained. Again, as with coping with stressful situations, the solution to solving projects may be an iterative process. This environment provides fruitful ground for a culture of problem solving and planning to emerge. The project management practices individuals use and the project management maturity of the organisation in which they operate can be seen as an embodiment of the project management culture.

2.3 Individual Project Management Competence

Project management is described by the PMI as being the process of applying *"knowledge, skills, tools and techniques to project activities to achieve project aims"* (PMBoK®Guide, 2008, 6). The knowledge, skills, tool and techniques invariably

focus on the requirement to analyse the problem, seek out solutions, select the most appropriate solution, plan out the course of action, implement the action and review the results. These features are common across all project management approaches regardless of whether an organisation is using a traditional project management approach such as the PMI's Guide to the Project Management Body of Knowledge (PMBoK®Guide, 2008) or PRINCE2 (OGC, 2009) or whether they are adopting one of the more iterative approaches such as Agile Project Management or Rapid Application Development. The only difference is the degree of detail of each step and the number of allowable iterations within a single project.

Project management practice can be analysed from two perspectives: firstly, that of the individual project manager; and secondly, that of the organisation in which the project manager is functioning. The following sections explore the current models of assessment of both individual and organisational project management competence and go on to develop the model used in this research to explore the extent of the project management acculturalisation of project managers.

2.3.1 Individual Competence Models

The concept of competence has been investigated in many domains and has resulted in a number of varied theories and models being proposed and used around the world. Crawford, in her doctoral thesis (2000b) and subsequent research (2000a, 2001, 2002a, 2002b, 2003), explored the three major competence models used widely across the globe; the traditional approach, the competency model approach and the competency standards approach. Crawford has posited a fourth integrated model of competence of her own, the *integrated approach* (Crawford, 2000b).

a. The Traditional Approach

The traditional approach is represented by Crawford as, "people would be regarded as competent to do a task or job if they had the right qualifications……. The ability to do the task was generally inferred, by employers and others, from a record of experience" (Crawford, 2000b, 12). This approach is still popular in many industries however for the purposes of this study and project management generally it is not appropriate. The primary reason being, that project management qualifications are still relatively new

and relatively few project managers have formal qualifications that can be relied upon in a consistent manner for inferring competence to perform the tasks required. Crawford also points out that this approach may not be as effective in situations that differ greatly from the environment in which past successes were gained. The very nature of projects being unique undertakings ensures that there is a high probability that the project environment of today's project is different from the projects of yesterday.

b. The Competency Model Approach

The competency model approach is derived from the work of Spencer and Spencer (1993) and Boyatzis (1982). Both sets of researchers use the definition of competence in the work place to be 'an *underlying characteristic* of an individual that is *causally related* to *criterion-referenced effective and/or superior performance* in a job or situation" (Spencer and Spencer, 1993, 9). Fundamental to this approach is the concept of threshold performance being "*a person's generic knowledge, motive, trait, self-image, social role, or skill which is essential to performing a job, but is not causally related to superior job performance"* (Boyatzis, 1982, 23) and superior performance. This approach is designed to use competencies to assess individuals with the purpose of seeking out distinguishing or superior competence and performance.

This approach, otherwise referred to as the Behavioural or Personal Competencies Approach, focuses on the assessment of not only knowledge (qualifications) and skills (ability to do the job) but also on a set of core personality characteristics including motives, traits and self concept (Crawford, 2000b, p13). Cheetham and Chivers report that *"These include things like self-confidence, control of emotions and interpersonal skills"* (1998, 268). This model has been used by project management researchers such as Birkhead, Sutherland and Maxwell who adopted the definition of "competency" as being *"taken to comprise two elements - the actual performance of a required skill, and the personal attributes which underlie such performance"* (2000, 90). McLagan goes on to say that *"These competencies [superior competencies] usually focus on people's abilities with roots in intelligence and personality"* (1997, 41). This focus on personality characteristics is a clear differentiator between the competency model approach, the traditional approach and the competency standards

approach discussed in the following section. This differentiator is not necessarily a positive one as Cheetham and Chivers note:

> *"Personal competence may be a better predictor of capability than functional competence, which attests primarily to competence within a candidate's current post. However; there is no guarantee that a person who apparently has the right mix of personal competencies will be able to "pull it all together"* and *deliver the desired outcomes"* (1996, 22).

Another key feature of Competency Model Approach is the view, as stated by Boyatzis, that a *"person's set of competencies reflect his or her capability. They are describing what he or she can do, not necessarily what he or she does"* (1982, 23). This last feature is a key differentiator between the Competency Model Approach and the Competency Standards Approach which relies on demonstrable performance, i.e. assessment of what a person has done rather than what they can do.

c. The Competency Standards Approach

The Competency Standards Approach, also known as the Functional Competence Approach (Cheetham and Chivers, 1998), is based on the performance based competency standards used by a number of national qualifications bodies around the globe. These standards form the foundation of vocational education in a number of countries including England (National Vocational Qualifications), Australia (National Qualifications Framework), South Africa (South African Qualifications Authority), Scotland, New Zealand and Spain. More recently project management professional associations and independent bodies have created and/or adopted performance-based standards as part of their offering to members. These include, the Global Alliance for Project Management Performance Standards, the Project Manager Competency Development Framework (Project Management Institute, 2007), the American Society for the Advancement of Project Management, the Australian Institute of Project Management's certification standards (AIPM, 2008) and the Association for Project Management's Competency Framework (APM, 2008).

The nature of performance-based standards is to infer competence from demonstration of the required skills. This demonstration can be through evidence of actual work

completed on past projects or through simulation or direct observation of work on a current project. There is a consistent format for performance based standards across nations with some minor variation in terminology. The following definitions are taken from the Australian National Training Information Service (NTIS):

> ***Unit of Competence:*** National standards define the competencies required for effective performance in the workplace. A competency comprises the specification of knowledge and skill and the application of that knowledge and skill at an industry level, to the standard of performance required in employment.
>
> ***Element of Competence:*** any of the basic building blocks of a unit of competency which describe the key activities or elements of the work covered by the unit.
>
> ***Performance Criteria:*** the part of a competency standard specifying the required level of performance in terms of a set of outcomes which need to be achieved in order to be deemed competent.
>
> ***Range of Variables:*** the part of a competency standard which specifies the range of contexts and conditions to which the performance criteria apply.

This approach has been adopted by several national government bodies as the foundation for formal qualifications systems and most recently the European Union (EU, 2008) has incorporated performance based competencies into the vocational education program. The Approach is not, however, without its critics. Curie and Darby in their analysis of competence-based management development note that there are two common criticisms of the competence standards approach: (i) the definition of competences and (ii) assessment of competences (Currie and Darby, 1995). In relation to the former complaint one of the key arguments is put forth as

> *"there was no discrimination between high and low performers....Threshold competences are basic requirements to carry out the job, but they do not differentiate between high and low performers."* (Currie and Darby, 1995, 14)

And for the latter point

> *"People perform successfully for different reasons at different times and under different sets of circumstances."* (Currie and Darby, 1995, 13)

d. An Integrated Approach

Crawford suggests (2000b) an integrated model as the preferred solution for assessing and developing project management competence. Her model takes the four key components of the earlier approaches, knowledge, skills, behaviours (personality attributes) and demonstrable performance and combines them into a single view. Her model is as follows

Knowledge (qualifications) + ***Skills*** (ability to do a task)	**Input Competencies:**	the knowledge and understanding, skills and abilities that a person brings to a job
+	+	
Core Personality Characteristics (Motives + Traits + Self-Concept)	**Personal Competencies:**	the core personality characteristics underlying a persons capability to do a job
+	+	
Demonstrable performance in accordance with occupational / professional / organisational Competency Standards.	**Output Competencies:**	the ability to perform the activities within an occupational area to the levels of performance expected in employment

Figure 1 - Crawford's Integrated Model of Project Management Competence
(Crawford, 2000b, 19)

Although Crawford is an influential authority on the subject of project management competence assessment and development for project managers and the primary author of the integrated model there are numerous other integrated models of competence proposed by researchers in other disciplines. An example of such models is the one developed by Cheetham and Chivers that offers a new model of professional

competence with four key components that are overarched by a set of meta-competencies *"The concept of meta-competence, while falling short of providing a holistic model of professional competence, nonetheless identifies an important principle which ought to be taken into account when constructing such a model; namely that there are certain key competencies which overarch a whole range of others"* (Cheetham and Chivers, 1996, 23). The four key components and their constituents are as follows.

1. Functional competence
    - Occupation specific (numerous tasks related to a particular profession)
    - Organisational/process (tasks of a generic nature e.g. planning delegating)
    - Cerebral (skills requiring primarily mental activity)
    - Psychomotor (skills of a more physical nature)
2. Personal or Behavioural competence
    - Social/vocational (behaviours that relate to the performance of the main body of professional task, stamina self-confidence)
    - Intra-professional (behaviours related to the interaction with other professionals/collegiality)
3. Knowledge/cognitive competence
    - Tacit/practical (knowledge linked to specific functional or personal competencies)
    - Technical/theoretical (relates to the underlying knowledge base of a profession)
    - Procedural (the how what, when etc of the more routine tasks of a profession)
    - Contextual (general background knowledge specific to an industry, organisation etc)
4. Values/ethical competence
    - Personal (adherence to personal moral/religious codes)
    - Professional (adherence to professional codes)

For the purposes of this research the Competency Standards Approach is being used as the primary model for assessing individual project management competence. The assessment process however uses the self assessment technique developed by Crawford. The Competency Standards Approach provides the clearest assessment of

the application of problem solving and planning actions by project managers, the core features under investigation. The activities defined in the performance criteria typically describe clear, demonstrable activities such as "identify risks" (ANCSPM, 2004) and "plan for the work of the project" (GAPPS, 2007). Project management standards are discussed in more detail in the following section, Section 2.3.2.

2.3.2 Project Management Standards

As discussed in section 2.3.1 above, competency has several meanings and a varied number of approaches for assessment. The same is true of the term 'standards' as articulated in the project management context by Crawford and Pollack (2008). This thesis will concentrate on a review of the currently available standards for project management and will differentiate between those that are performance based and those which take on more of a hybrid format.

Currently there are numerous project management standards, both government sanctioned and private sector developed, available for use for assessment and developmental purposes. For the purposes of this thesis these standards have been assigned to three categories (i) knowledge based standards, (ii) performance based standards and (iii) hybrid standards.

e. Knowledge Based Standards

The primary project management knowledge based standard is the Project Management Institute's Guide to the Project Management Body of Knowledge (PMBoK®Guide, 2008). This guide is a privately developed, American National Standards Institute (ANSI) endorsed standard which documents the key knowledge areas that project managers are expected to know and be assessed against. As is typical for knowledge based standards, a multiple choice knowledge test is used for assessment. At least three years of project management experience, with 4,500 hours leading and directing projects and 35 hours of project management education is a pre-requisite for sitting the test in order to provide a background of experience. This approach is aligned with the traditional approach to competence as discussed in section 2.3.1 above. This standard and its structure has been the greatest influence on project management standards to date with its influence clearly found in the structure of the Australian National Standards for Project Management (Australian National

Training Authority, 2004a), the topics of the International Project Management Association's International Competency Baseline (2006) and project management text books the world over.

The guide is structured around nine knowledge areas, Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Communications Management, Project Risk Management and Project Procurement Management. Across and within each of these knowledge areas are the process groups, Initiating, Planning, Executing, Monitoring & Controlling and Closing. Figure 2 below shows the nine knowledge areas and their component parts.

The stated purpose of the PMBoK®Guide 2008 is "*to identify that subset of the Project Management Body of Knowledge that is generally recognised as good practice"(PMBoK®Guide, 2008, 4)*. It is not by any means a prescriptive standard to be applied in full to every project. The guide states that *"Good practice does not mean that the knowledge described should be applied uniformly on all projects, the project team is responsible for determining what is appropriate for any given project" (PMBoK®Guide, 2008, 4)*. This study will not be using the PMBoK®Guide as the foundation for the assessment of individual competence for the reasons discussed in section 1.3.1 above and for the fact that this standard is only applicable (in its current form) for assessing knowledge. The hypotheses in this study are built on an assumption that strong correlations will be found between project management culture where the culture is measured by the actions of project managers rather than their knowledge about appropriate project management actions.

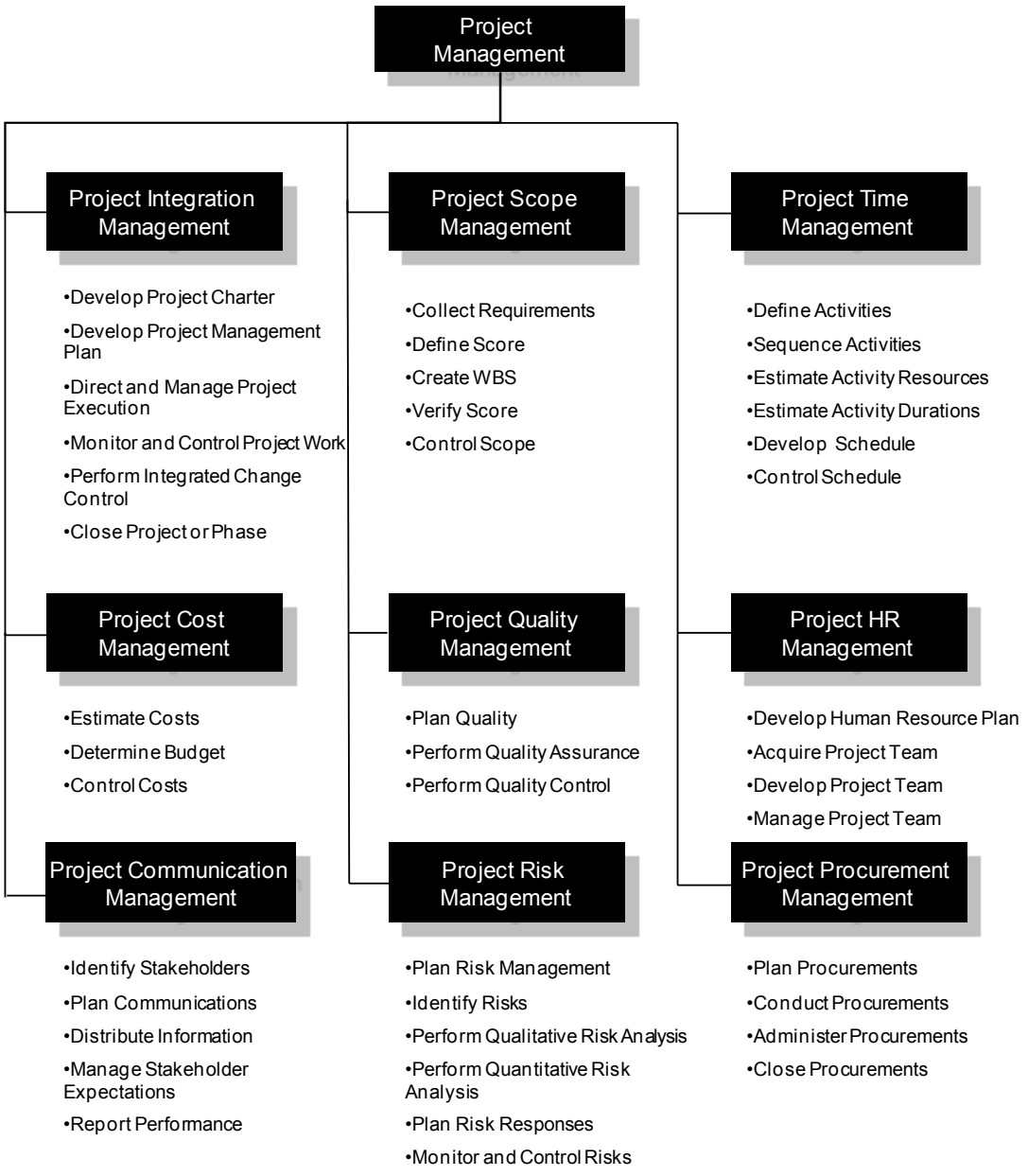

Figure 2 - Overview of Project Management Knowledge Areas and Processes PMBoK®Guide 2008

f. Performance Based Standards

Crawford refers to performance based standards as those that "describe what people can be expected to do in their working roles, as well as the knowledge and understanding of their occupation that is needed to underpin these roles at a specific level of competence" (2000b, 59). Traditionally performance based standards have been the domain of governments where the primary aim is the up-skilling of a nation and awarding qualifications based on the assessment of skills acquired. The UK,

South African and Australian Governments currently have project management performance based standards in operation for a number of project roles ranging from team member to project/program director. However the most recent performance based standards for project management to be released are the Global Project Manager Standards from the Global Alliance for Project Performance Standards (GAPPS, 2007). GAPPS is the first independent global group comprising representatives of government agencies, professional associations and industry, to develop performance based competency standards for project managers that are applicable across all industries and project types. The purpose of the GAPPS Project Manager Standard is to provide a framework for assessment and development of project managers and the transportability of qualifications between nations. A valuable aspect of performance based standards *"is that they are specifically designed for assessment purposes, and are developmental in their approach, with assessment being undertaken by registered Workplace Assessors, within a well defined quality assurance process.",* (Crawford, 2000b, 59). The GAPPS Project Manager Standard, in providing a transition from national to global standards, has expanded the value of such standards to that of a truly global conductor of project management practice and qualifications allowing individuals and organisations to compare and contrast various project management practices, certifications and qualifications.

The Australian National Competency Standards for Project Management (IBSA, 2008) and the GAPPS Project Manager Standards (GAPPS, 2007) currently have the most robust coverage of the role of the project manager and are discussed in more detail below. The current South African standards are targeted at a more junior role and are not applicable to this study. The UK standards have not been as successful in their application due to a range of reasons however two (2) significant factors are firstly one of cultural acceptance of performance-based standards as an appropriate means of assessing managerial skills (as opposed to technical or trade skills) particularly in the UK, and secondly the lack of cross industry input to the development of the standards. These are therefore not discussed further. The Complex Project Manager Standards (Defence Materiel Organisation, 2006) were recently released by the Australian Defence Materiel Organisation and have received some international attention. However these standards are written for a role beyond that of the project manager and are only applicable to a select few managing extremely large

and complex projects. As such they are not applicable to this research and will not be discussed in any more detail.

i. The Australian National Standards for Project Management

The Australian National Standards for Project Management were originally developed by the Australian Institute of Project Management and endorsed by the Australian Government, which supported their development, in 1996. At that time they were endorsed as individual units for assessment and were not packaged as a qualification within the then National Qualification Framework (NQF) for assessment purposes. The unit standards are structured according to the nine knowledge areas found in the PMBoK®Guide (2008). This decision was made to recognise the contribution of the guide to the underpinning knowledge within the standards and to assist with the promotion of the standards (Crawford, 2000b). In 2004 Business Services Training Australia, now the Innovation and Business Skills Council of Australia, took formal ownership (and copyright) of the standards on behalf of the Crown and conducted a review. This review resulted in relatively few and no substantial changes to the standards. At this time the standards were formally incorporated into the Business Services Training Package (Australian National Training Authority, 2004a) and later updated (IBSA, 2008). The Business Services Training package includes a Certificate IV in Project Management, Diploma of Project Management and an Advanced Diploma of Project Management. Table 1 below details the alignment of qualifications with project roles.

Table 1 - Comparison of Australian Project Management Qualifications and Experience Requirements

Business Services Training Package Qualification	***Level of experience required for assessment of competence at this level***
Certificate IV in Project Management	Specialist or Team member
Diploma of Project Management	Project Manager of a single project
Advanced Diploma of Project Management	Program Manager or Project Director of multiple projects

Separate to this training package the Australian Quality Training Framework (AQTF) includes a Public Sector Training Package (Australian National Training Authority, 2004b) which also contains a set of project management standards that are equivalent to the project management units of competence within the Business Services Training

Package qualifications however they are structured in a lifecycle format rather than by the nine knowledge areas as found in the PMBoK®Guide (2008). Table 2 below compares the format and content of the Diploma Level project management units of competence from both the Public Sector and Business Services Training Packages highlighting the differences in the frameworks used to structure different project management performance based standards. As can be seen the same topic of assessment can be conceptualised and framed in a variety of different ways. The structure of standards contributes to the usability in both assessor and self-assessment contexts.

Table 2 - Comparison of the Unit Structures of the Project Management Components of the Business Services and Public Sector Training Packages at the Diploma Level

Business Services Training Package Units of Competence	***Public Sector Training Package Units of Competence***
Manage application of project integrative processes	Design complex projects
Manage project scope	Manage complex projects
Manage project time	Close complex projects
Manage project cost	
Manage project quality	
Manage project communications	
Manage project human resources	
Manage project risk	
Manage project procurement	

To date the project management units in the Business Services Training Package have been more widely used for assessment and development than the Public Sector Training Package units. These standards have also received more attention from the research community than the Public Sector standards (Crawford, 2000b, Crawford, 2000a, Crawford, 2002b, Crawford, 2003). However the decision to structure the standards in alignment with the nine knowledge areas of the PMBoK®Guide (2008), although excellent at the time of publication, has proved to be difficult to implement in an assessment context. In her doctoral (and subsequent) work Crawford found that assessment of a project manager's competence across the nine units was counter-intuitive and required the performance criteria to be re-ordered into a lifecycle format. This coupled with the growing adoption of project management across a wider range of project types and increased globalisation of projects has led the push for new global standards for project management to be developed. The latest performance based standards to be released that addresses these issues are the Global Project Manager

Standards produced by the Global Alliance for Project Performance Standards (GAPPS). These are discussed in more detail in the following section.

ii. GAPPS – Project Manager Standards

The GAPPS Project Manager Standards (GAPPS, 2007) were released in October 2006 by GAPPS, with a technical revision in 2007. They were developed in a collaborative manner by members of GAPPS which include government qualification authorities from Australia, South Africa and New Zealand, industry including Motorola and Shell, academic institutions including the University of Technology Sydney, ESC-Lille France (now SKEMA Business School), Athabasca University and Cambridge International Examinations. The final group that participated in the development are the national and regional project management associations and include the Project Management Institute, the Australian Institute of Project Management, the Association for Project Management (UK), the Greater China Project Management Association, asapm (USA), PMSA (South Africa), the Society for Project Managers (Singapore) and the Project Management Association of Japan. Many but not all of the project management associations that have contributed to the standards' development remain current members of GAPPS.

The process for developing the GAPPS Project Manager Standards began with research conducted by Crawford (2004) which reported the analysis of all the major existing project management knowledge guides and standards. The purpose of this research was to identify the topics that were common across all the standards and knowledge guides as a means of informing the new global standards. This analysis resulted in forty-eight topics where commonality was achieved. These topics were then grouped by the GAPPS members into units. The "most projects most of the time" rule was applied to the units and it was determined that four of the units were not applicable to most project managers on most projects and should not be included in the global standards for project managers. These units and the topics are shown in Figure 3 below (Crawford, 2004, 11).

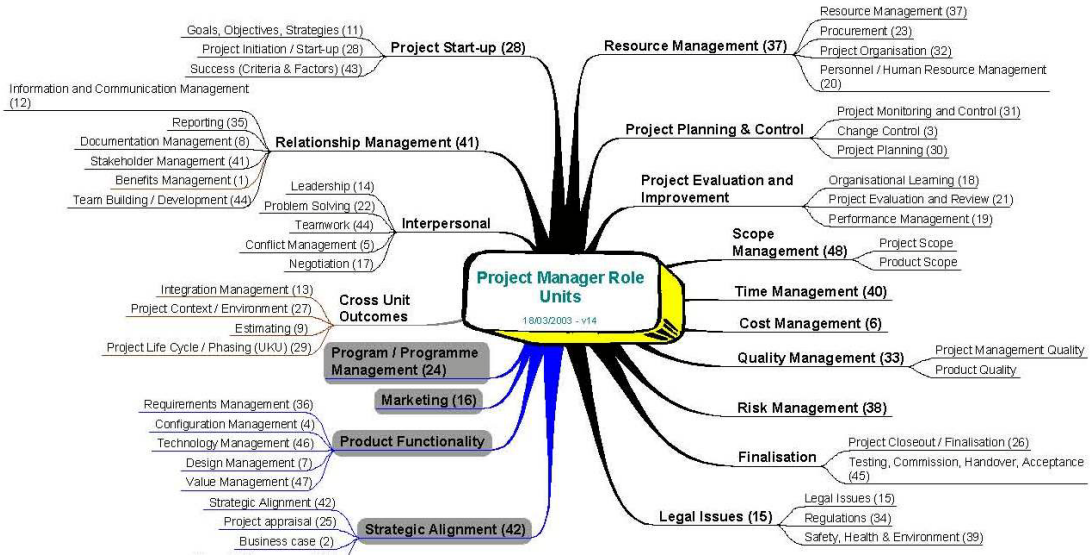

Figure 3 - Units developed from 48 Concepts / Topics

Units considered to be applicable only to some Project Managers in some contexts are shown shaded.

The second step in the process was to conduct a detailed analysis of the role of the project manager. This analysis resulted in the development of the Crawford-Ishikura Factor Table for Evaluating Roles (CIFTER). The CIFTER enables projects to be systematically evaluated for their management complexity. The CIFTER is used to differentiate projects into three categories of complexity (i) below Global Level 1 , (ii) Global Level 1 (G1) and (iii) Global Level 2 (G2). These levels equate to simple projects, moderately complex projects and very complex projects. If a project is assessed as meeting the G1 complexity requirements evidence from this project can be used to support an assessment against the standards at G1; if a project meets the G2 complexity requirements evidence from this project can be used to support an assessment at the G2 level. Figure 4 below contains the CIFTER factors and ratings

Project Management Complexity Factor	Descriptor and Points			
1. Stability of the overall project context	Very high (1)	High (2)	Moderate (3)	Low (4)
2. Number of distinct disciplines, methods, or approaches involved in performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
3. Magnitude of legal, social, or environmental implications from performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
4. Overall expected financial impact (positive or negative) on the project's stakeholders	Low (1)	Moderate (2)	High (3)	Very high (4)
5. Strategic importance of the project to the organisation or organisations involved	Very low (1)	Low (2)	Moderate (3)	High (4)
6. Stakeholder cohesion regarding the characteristics of the product of the project	High (1)	Moderate (2)	Low (3)	Very low (4)
7. Number and variety of interfaces between the project and other organisational entities	Very low (1)	Low (2)	Moderate (3)	High (4)

Figure 4 - CIFTER Table

The standards themselves were refined from the original 48 topics and 14 units to a final set of six units. The performance criteria are identical for G1 and G2 assessment however the evidence required to be deemed competent at each level differs. The rationale behind this is that the complexity of the project does not change what the project manager needs to do e.g. identify risks, but it will alter how the project manager performs the task and the evidence they would need to present to prove their competency. Since the purpose of performance based competencies is to describe, what needs to be done not how, having identical performance criteria was deemed appropriate. The only change between the two levels of certification is that for G1 the final unit of Evaluate Project Performance is not required to be assessed. Table 3 below lists the units of competence required for both G1 and G2.

Table 3 - Comparison of Units of Competence for Global Level 1 and Global Level 2

Global Project Manager – Global Level 1 Units of Competence	*Global Project Manager – Global Level 2 Units of Competence*
Manage Stakeholder Relationships	Manage Stakeholder Relationships
Manage Development of the Plan for the Project	Manage Development of the Plan for the Project
Manage Project Progress	Manage Project Progress
Manage Product Acceptance	Manage Product Acceptance
Manage Project Transitions	Manage Project Transitions
	Evaluate and Improve Project Performance

As Table 3 above shows, the GAPPS standard for project managers has moved away from the nine knowledge areas found in the PMBoK®Guide (2008) and has adopted a unique structure that allows assessments to be conducted more easily without the need for translating or reordering the units, elements or performance criteria.

g. Hybrid Standards

The final classification of standards is a general category called hybrid standards. This term is used to describe those project management standards that do not conform to the formal structure of performance based standards and those that go beyond the description of commonly accepted knowledge of project management practice. The two major internationally accepted standards in this category are the International Competency Baseline (ICB) (International Project Management Association, 2006) and the Project Manager Competency Development Framework (Project Management Institute, 2007). These will be discussed in further detail in the following sections.

i. IPMA – International Competency Baseline

The International Competency Baseline (ICB) was recently reviewed and the third edition was released in 2006. The first version of the ICB also known as the 'sunflower' began development in 1993 and was released in 1999 as Version 2.0. A subsequent edition Version 2.0b was released in 2001. The 1999 version was classified by Crawford as a knowledge based standard (2000b, 47) as it was structured according to twenty-eight core units of knowledge and experience and fourteen elective units (International Project Management Association, 1999). The third edition has introduced an entirely new structure that separates the elements (or topics) into three (3) groups, technical, contextual and behavioural competencies, the behavioural competencies being an entirely new addition to the standard. The inclusion of specific behaviours into the primary section of the standard is one of the key differentiators that lead to the classification of the ICB as a hybrid standard. Nearly all project management standards address behaviours in some way however the knowledge standards have behaviours implicit within some of the actions described. Performance based competency standards are slightly more explicit about defining the behavioural qualities that underpin the activities described in the performance criteria by listing a set of general behavioural skills such as flexibility and problem solving that may be of benefit when developing evidence to support competence however they are not

assessed independent of the activities within the standard. Table 4 below lists the elements of competence within each of the three (3) categories of the IPMA ICB.

Table 4 - IPMA ICB Categories and Elements

Category	*Elements*
Contextual Competencies	Project orientation
	Programme orientation
	Portfolio orientation
	Project programme & portfolio implementation
	Permanent organisation
	Business Systems, products & technology
	Personnel management
	Health, security, safety & environment
	Finance
	Legal
Technical Competencies	Project management success
	Interested parties
	Project requirements & objectives
	Risk & opportunity
	Quality
	Project organisation
	Teamwork
	Problem resolution
	Project structures
	Scope & deliverables
	Time & project phases
	Resources
	Cost & finance
	Procurement & contract
	Changes Control & reports
	Information & documentation
	Communication
	Start-up
	Close-out
Behavioural Competencies	Leadership
	Engagement & motivation
	Self-control
	Assertiveness
	Relaxation
	Openness
	Creativity
	Results orientation
	Efficiency
	Consultation
	Negotiation
	Conflict & crisis
	Reliability

Category	*Elements*
	Values appreciation
	Ethics

Each element includes a detailed description about the definition of the term which fulfils the knowledge standard component of the hybrid standard. The ICB provides a list of suggested process steps that describe actions that demonstrate application of the term or concept being described. Although these are not written in the same syntax as that required for performance based competencies and often deal with the how as well as the "what" of the required actions, these suggested process steps fulfil a similar function to that of the performance based standards in the hybrid model. The result of the new structure and content is that the ICB now deals with a mix of knowledge about project management concepts, demonstrable performance against each knowledge topic and specific behaviours that are deemed to be associated with good project management.

ii. PMI - Project Manager Competency Development Framework

The Project Manager Competency Development Framework (PMCDF) began development in 1998. The first edition was released by the Project Management Institute in 2002 as a framework for personal development of project managers. (Project Management Institute, 2002, 1). This was revised with significant changes in the second edition, (Project Management Institute, 2007). The original rhetoric surrounding the release was that the PMCDF was a framework for development and not a PMI Standard. This distinction has in recent times been abandoned and the PMI now promotes the PMCDF as one of the standards within their suite of standards on project, program and portfolio management.

The PMCDF (Project Management Institute, 2002, 2) was developed using the following definition of competence

> *"a competency is a cluster of related knowledge, attitudes, skills, and other personal characteristics that:*
>
> - *Affects a major part of one's job*
> - *Correlates with performance on the job*
> - *Can be measured against well-accepted standards*
> - *Can be improved via training and development*

•Can be broken down into dimensions of competence"

As part of the revisions for the second edition the definition of competence was updated to reference Crawford's Integrated Model (Crawford, 1997).

The definitions above, coupled with the decision to write the standard in the format of a performance based competency standard has resulted in its being classified as a hybrid standard. As with the ICB discussed earlier the PMCDF includes a mixture of knowledge about project management processes and concepts, demonstrable performance of project management tasks and demonstration of particular behaviours all of which are deemed to be "the generic competencies needed in most projects, in most organisations, and in most industries" (Project Management Institute, 2002, 4).
The structure of the standard includes

- Units of Competence
  - Elements
    - Performance Criteria

This structure is similar to the traditional format for performance based competency standards. An analysis of the performance criteria within the original framework (Project Management Institute, 2002) revealed that although the format of the document aligned with performance based competency standards the content includes a number of descriptions of activities that must be demonstrated as well as providing precise instructions on how the activity must be demonstrated. An example of this can be found in element 3.2.2 Conduct Activity Sequencing. Here, one of the performance criteria is "Construct a project network diagram." (Project Management Institute, 2002, 25). This is a description of a specific type of evidence that can be used to support the activity of sequencing activities; however it is by no means the only form evidence could take. The second edition (Project Management Institute, 2007) has eliminated most of these and realigned the format and content of the standard to more closely align with traditional performance based standards. This is undoubtedly due to the influence of the newly adopted definition of competence from Crawford's work (1997) .

The original development of the PMCDF drew heavily on A Guide to the Project Management Body of Knowledge (Project Management Institute, 2000a), the Project

Management Experience and Knowledge Self-Assessment Manual (Project Management Institute, 2000b) and the Project Management Professional (PMP) Role Delineation Study (Project Management Institute, 2000c). In the second edition review the structure was significantly altered and resulted in two key sections being the Performance Competencies and Personal Competencies. The structure of the standards is shown in the figure below.

Performance Competencies	Personal Competencies
- Initiating a project - Planning a project - Executing a project - Monitoring & Controlling a project - Closing a project	- Communicating - Leading - Managing - Cognitive Ability - Effectiveness - Professionalism
Knowledge Competence	

Figure 5 - Structure of the PMCDF 2nd Edition

The behavioural competencies are included under the heading of Personal Competencies. *"Personal Competencies are those behaviours, attitudes and core personality characteristics that contribute to a person's ability to manage projects"(Project Management Institute, 2007)* The personal competencies from the first edition were drawn from Spencer and Spencer's (1993) work on managerial competencies. For each of the selected behaviours performance criteria in the project context were written. For the second edition this section of the standard has been significantly revised and there is no longer any identifiable or reference source for the selection and inclusion of the competencies found in this standard. The deviation from proven and well founded research into human behaviour in favour of following the traditional skills based standard development process of role analysis by practitioners for behavioural competencies imbues the standard with uncertainty regarding the validity of the standard as an assessment tool. Similarly the behavioural components of the ICB (International Project Management Association, 2006) are the collected works of a series of project manager discussions on effective project manager behaviours rather than the results of empirical research and fact.

"It is surprising, given the extensive research and investment that has gone into defining input competencies and demonstrable performance standards, that so little

attention has been paid to behavioral competencies…..notwithstanding the brief listing of competency areas within the existing bodies of knowledge, no standards are currently available for the behavioral competencies that can be used to differentiate superior and average performance [in the project management context]" (Dainty et al., 2005, 41)

Further to the lack of a research basis for the personal competencies being claimed to be those required for competent project managers by these standards, Dainty, Cheng and Moore's (2005) research into the behavioural competencies of construction project managers revealed that project management competencies differed from general management behaviours (Spencer and Spencer, 1993, Boyatzis, 1982) in several important respects. They found that the concepts of flexibility, self-control and customer service orientation were essential to project management competence and are not found in the general management competency model. However, more importantly, three of the behaviours in the general management competency model were found to not be related to project manager competence. These included Self-confidence, Developing Others and Directiveness/Assertiveness. None of the essential competencies found by Dainty et al are evident in the structure of the PMCDF (Project Management Institute, 2007) and two (2) of the three (3) competencies Dainty et al found to be unrelated to effective project management are found in the PMCDF (Project Management Institute, 2007). Aitken and Crawford (2008), in their study into senior management perceptions of behaviours of effective project managers found, among other things, that conceptual thinking ranked second lowest out of a thirty-two (32) factor model of behavioural competencies required for effective project managers. This is inconsistent with the PMCDF where conceptual thinking is represented within Cognitive Ability (Project Management Institute, 2007).

None of the hybrid models have been used in the current study. Their development has predominantly been by private professional organisations where the input has either been controlled by a select few from a single entity and/or supplemented with individual practitioner opinion. There is no clear research foundation for the content of the standards and they have therefore been deemed inappropriate for use in this study.

2.3.3 Summary

The competency standard approach has been adopted in the research design for this study as it focuses clearly and solely on the activities performed by the project manager in the application of project management practice. In constructing the notion of project management culture the actions taken by project managers as they plan and problem solve their way through projects is hypothesised to be positively correlated to the direct and deliberate actions they take in choosing to plan and problem solve their way though stressful events at work, home and with their personal health. The influence of personality characteristics and behaviours in general are not part of the current hypothesis and thus the competency model and hybrid models with their emphasis or inclusion of behaviours and attitudes are not appropriate. Similarly the integrated model proposed by Crawford (2000b), although an excellent model for the holistic assessment and development of project management practitioners is also too broad to be used in this research. Within the available standards found in the Competency Standard Approach, the current research has selected to use the GAPPS standard as the measure of individual project management competence for several reasons including: they are the most recently developed, they reflect the widest range of input from all sectors of the project management community, they are easily applied by individuals in a self assessment context (Aitken and Crawford, 2007) and they are the only standards with a mechanism for assessing project complexity, a key feature in the project management culture assessment being used within this study. The self-assessment tool that enables these standards to be effectively used as self-assessment instruments is based on the model developed by Crawford (2000b).

2.4 Organisational Project Management Maturity

Organisational project management maturity represents the second key concept being used to formulate the construct of project management culture within this research. Project management maturity models were borne out of the software development maturity models. In particular the Capability Maturity Model (CMM), often known by the more recent adaptation as the Capability Maturity Model – Integration (CMMI), developed by the Software Engineering Institute at Carnegie Mellon has provided much of the basis for the current project management maturity models. CMMI is defined as

> *"Capability Maturity Model® Integration (CMMI) is a process improvement approach that provides organisations with the essential elements of effective processes. It can be used to guide process improvement across a project, a division, or an entire organisation. CMMI helps integrate traditionally separate organisational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes"* (SEI, 2006a)

CMMI unifies the process improvement standards developed by SEI for Systems Engineering, Software Engineering, Integrated Product and Process Development, and Supplier Sourcing. This unified standard includes (SEI, 2002) four process areas,

1. Process Management
2. Project Management
3. Engineering
4. Support

CMMI was the first widely accepted maturity model for the measurement of the overall capability of an organisation to deliver products and services and is particularly focused on high technology projects. There are four (4) process areas, process management, project management, engineering and support. This thesis is only concerned with the project management process area the most recent details of which are documented in the CMMI for Development Standard (SEI, 2006b).

> *"CMMI for Development consists of best practices that address development and maintenance activities applied to products and services. It addresses practices that cover the product's lifecycle from conception through delivery and maintenance. The emphasis is on the work necessary to build and maintain the total product."* (SEI, 2006b, 3)

CMMI is a holistic model that addresses multiple areas of organisational practice. Within CMMI for Development there are a number of models that contain practices that include project management, process management, systems engineering, hardware engineering, software engineering, and other processes used in development and maintenance. The CMMI for Development +IPPD model also covers the use of integrated teams for development and maintenance activities (SEI, 2006b, 8). The breadth of coverage of the CMMI is one of the primary reasons for not selecting CMMI as a means of assessing organisational project management maturity in this study. The use of CMMI would necessitate collecting a substantial amount of data that is not pertinent to the research questions being posed. CMMI is also an instrument that requires a significant amount of training to be able to use and is time consuming in its application. A project management specific model of organisational maturity allows for a targeted approach to measurement.

Many of the existing project management specific maturity models draw on CMMI. Most notably nearly all the major project management maturity models use a five (5) point rating scale to determine the overall level of project management maturity of an organisation identical to the five point scale developed for CMMI (Cooke-Davies, 2002, 3). The CMMI scale is defined as follows:

"Maturity Level 1: Initial

At maturity level 1, processes are usually ad hoc and chaotic. The organisation usually does not provide a stable environment to support the processes. Success in these organisations depends on the competence and heroics of the people in the organisation and not on the use of proven processes. In spite of this chaos, maturity level 1 organisations often produce products and services that work; however, they frequently exceed their budgets and do not meet their schedules.

Maturity Level 2: Managed

At maturity level 2, the projects of the organisation have ensured that processes are planned and executed in accordance with policy; the projects employ skilled people who have adequate resources to produce controlled outputs; involve relevant stakeholders; are monitored, controlled, and reviewed; and are evaluated for adherence to their process descriptions. The process discipline reflected by maturity level 2 helps to ensure that existing practices are retained during times of stress. When these practices are in place, projects are performed and managed according to their documented plans.

Maturity Level 3: Defined

At maturity level 3, processes are well characterized and understood, and are described in standards, procedures, tools, and methods. The organisation's set of standard processes, which is the basis for maturity level 3, is established and improved over time. These standard processes are used to establish consistency across the organisation. Projects establish their defined processes by tailoring the organisation's set of standard processes according to tailoring guidelines. (See the glossary for a definition of "organisation's set of standard processes.")

Maturity Level 4: Quantitatively Managed

At maturity level 4, the organisation and projects establish quantitative objectives for quality and process performance and use them as criteria in managing processes. Quantitative objectives are based on the needs of the customer, end users, organisation, and process implementers. Quality and process performance is understood in statistical terms and is managed throughout the life of the processes

Maturity Level 5: Optimizing

At maturity level 5, an organisation continually improves its processes based on a quantitative understanding of the common causes of variation inherent in processes. (See the definition of "common cause of process variation" in the glossary.)

Maturity level 5 focuses on continually improving process performance through incremental and innovative process and technological improvements. Quantitative process improvement objectives for the organisation are established, continually revised to reflect changing business objectives, and used as criteria in managing

process improvement. The effects of deployed process improvements are measured and evaluated against the quantitative process improvement objectives. Both the defined processes and the organisation's set of standard processes are targets of measurable improvement activities." (SEI, 2006b, 38)

During the mid-1990s a number of project management specific models were developed that were more heavily influenced by the thinking of the project management profession (Cooke-Davies and Arzymanow, 2003). Today there are numerous project management maturity models available. According to Cooke-Davies (2002), there are over thirty (30) project management maturity models on the market today.

Cooke-Davies and Arzymanow (2003) categorise these models into two groups.
1. Those which attempt to demonstrate the benefit of PM to the organisation. Some examples include:
   - Ibbs and Kwak – PM^2
   - ESI/George Washington University
   - Kerzner
2. Those which incorporate an assessment of PM process as part of the organisation's overall quality assessment. Some examples include:
   - Baldridge National Quality Awards
   - European Forum for Quality Management
   - OPM3

The following section documents the three more widely used project management maturity models.

2.4.1 Organisational Project Management Maturity Model (OPM3)

The Organisational Project Management Maturity Model (OPM®3) is a product of the Project Management Institute. The PMI began development of OPM3 in 1998 using a team of volunteers from the PMI membership base. "The OPM3 seeks to describe and assess an organisation's ability to enact strategy through selection and delivery of multiple projects. It provides a hierarchical structure with a number of best

practices, each comprising multiple capabilities, with each capability leading to outcomes which can be assessed by key performance indicators (KPIs) and metrics" (Hillson, 2003, 300). OPM3 is *"a framework that provides an organisation-wide view of portfolio management, program management and project management to support achieving best practice within each of these domains"* (PMI, 2008, 1)

The PMI defines a maturity model as being *"a framework that describes the characteristics of effective processes in areas as diverse as strategic business planning, business development, systems engineering, project management, risk management, information technology (IT), or personnel management. The foundations of these models is that every process depends upon one or more capabilities or competencies that can be measured and assessed"* (PMI, 2008, 9)

In the assessment of maturity OPM3 takes a multi-dimensional view assessing both the relative best practice nature of the process being assessed and in terms of the process improvement cycle of standardize, measure, control and continuously improve (SMCI). This is rather more complex than the standard five (5) level assessment models applied to maturity models such as CMMI. Cooke-Davies describes OPM3 as "by far the largest and most complex of the project management maturity models and it might well turn out to be the most comprehensive. It recognizes the heritage of maturity models in the quality movement and acknowledges that "practices" are components of processes or process groups." (Cooke-Davies, 2004)

In addition to this complexity the structural design of the standard is constructed using a multi-axis approach incorporating the three (3) domains of project, program and portfolio management on one axis, the SMCI on the second axis and within each of these the process groups of initiating, planning, executing, monitoring & controlling and closing. Finally within each of the domains and at each of the process improvement stages there are best practices defined. Each best practice has a name, descriptor, capability and KPI, all of which are required to be assessed. The number of individual assessment criteria run into the hundreds. Currently the OPM3 product suite includes a range of supporting products including assessment tools, certifications and services. All services are built around the base model of maturity assessment.

Given the complexity of the standard itself the assessment tools are an essential aid to successful application. This thesis will not delve into the supporting tool set other than to acknowledge its existence. The supporting toolset is considered to be the means by which the PMI suggest the OPM3 model be administered. The complexity of the standard and associated assessment tools have contributed to a decision that this standard being unsuitable for this research.

2.4.2 Project Management Process Maturity (PM)^2 Model

Ibbs and Kwak (2000) conducted a study to determine the financial and organisational impacts of project management with a view to developing a means by which managers could measure project management processes. This resulted in a five (5) point maturity model called the *Project Management Process Maturity (PM)^2 Model*. This model was developed using a sample of thirty-eight (38) international companies across four (4) industries, engineering & construction, information management and movement, telecommunications/information systems and hi-tech manufacturing.

The *(PM)^2 Model* is based on the nine (9) knowledge areas and the five (5) process groups of the PMBoK®Guide (2008). The model contains a range of project management processes, organisational characteristics and focus areas that define each level of maturity. These are as detailed in Table 5 below.

Table 5 - Project Management Process Maturity Model

Level	Key PM Processes	Major Organisational Characteristics	Key Focus Areas
5	- PM processes are continuously improved - PM processes are fully understood - PM data are optimized and sustained	- Project-driven - Dynamic, energetic and fluid -Continuous improvement of PM processes and practices	- Innovative ideas to improve PM processes and practices
4	- Multiple PM (programme) - PM data and processes are integrated - PM processes and data are quantitatively	- Strong teamwork - Formal PM training for project team	- Planning & controlling multiple projects in a professional manner

	analysed, measured and stored		
3	- Formal project planning & control systems are managed - Formal PM data are managed	- Team oriented (medium) - Informal training of PM skills and practices	- Systematic and structured project planning and control for individual project
2	- Informal PM processed are defined - Informal PM problems are identified - Informal PM data are collected	- Team oriented (weak) - Organisations possess strengths in doing similar work	- Individual project planning
1	- No PM processes or practices are consistently available - No Pm data are consistently collected or analyzed	- Functionally isolated - Lack of senior management support - Project success depends on individual efforts	- Understand and establish basic PM processes

2.4.3 Corporate Practices Assessment

The Corporate Practice Assessment (CPA) is an excellence model, combining the assessment of both maturity and practice, created and tested by Cooke-Davies (2000) through his doctoral work using a benchmarking network of blue-chip organisations. The first step in the development of the assessment tool, the Corporate Practices Questionnaire (CPQ), was to create a network of organisations willing to participate in the action research proposed by Cooke-Davies. A minimum number of eight (8) and a maximum number of sixteen (16) participating organisations was established for the project.

A list of "topics" was generated that represented areas of project management interest for the members. This list was created using a prompt-list provided by the researcher. Network members suggested topics that they believed might be determinative for project success, and these were grouped into topic areas with explanations of each topic. No attempt was made to provide an overarching structure. The ten topics chosen for study were:

1. Integrating project working into the organisation
2. Managing human factors in projects

3. Defining project 'anatomy'
5. Estimating cost, time, and resource requirements
6. Analysing and managing risk
7. Managing quality
8. Monitoring and controlling progress
9. Closing projects
10. Measuring project performance

A series of questions were generated for each topic, and referred to the membership for comment. Members were asked to score themselves on a scale of 0 to 5 for each question. Scoring guidelines were prepared for each question in such a way that a spectrum of scores was appropriate from 0 at one end to 5 at the other. Creating a scoring guide at the individual question level was used to reduce the question of subjectivity in responses. Misinterpretation from a lack of clear definition of the levels being assessed in organisational maturity assessments can render an assessment void (Anderson and Jessen, 2003).

Members of the Human Systems network were asked to provide scores for both "approach" and "deployment" – similar to that used in the European Quality Award self-assessment instrument. They were also asked to cite evidence for why they had scored the questions as they did.

Cooke-Davies' (2000) research used the CPQ version 3 which is a 142 item questionnaire. Since then the CPQ has undergone a number of improvements, which has seen the number of questions reduced to 129 and then in the latest review and upgrade in 2008 being increased to a total of 143 items. In that time changes to how the assessment instrument is applied have been implemented. The assessment for approach is currently assessed by trained Human Systems assessment personnel (rather than the self assessment mode used in the Cooke-Davies' research). The deployment assessment is now conducted as a one-day workshop, facilitated by trained Human Systems assessment personnel also in place of the self assessment version. These changes were implemented to increase the consistency and reduce the subjectivity of assessments between and across organisations.

The key difference between the CPA and other maturity models is the assessment of both approach, which is similar to the other models that assess how well the organisational processes are set up, and the deployment. The deployment assessment is an evaluation of how well the individuals within the organisation actually use the processes and procedures established by the organisation for managing projects and continuously improving their processes. Unlike assessments such as CMMI where a single maturity level score is issued at the end of the assessment, the CPQ assessment does not provide a ladder of maturity from 0-5 that organisations must follow and hence no final "single level score" is issued. This is based on the assumption that a score of "5" may not be appropriate for every organisation in every context for every component of the model. The cost of developing and maintaining practices at the peak of excellence may not provide the necessary return in all instances.

2.4.4 Portfolio, Programme and Project Management Maturity Model

The Office of Government Commerce (OGC) in the UK has developed and released an organisational maturity model specifically designed to assess project, program and portfolio management maturity, the Portfolio, Programme and Project Management Maturity Model commonly known as P3M3 (OGC, 2008). Originally released in 2006 the P3M3 model was revised and updated in 2008 resulting in a three (3) part model allowing for an assessment of maturity at the project, program and portfolio management levels. The original P3M3 and subsequent 2008 version was based on the model for maturity assessment developed by the Software Engineering Institute for CMMI (OGC, 2008, 8) and as such retains the classic five (5) level assessment format of

Level 1 – awareness of process
Level 2 – repeatable process
Level 3 – defined process
Level 4 – managed process
Level 5 – optimized process

Descriptors are provided for each maturity level for project, program and portfolio management. The P3M3 interpretation of a classic maturity model grading system for the specifics of the project management industry is clear and simple to administer

relative to the other models reviewed. The table below provides the detailed descriptors.

Maturity Level	Portfolio Management	Programme Management	Project Management
Level 1 – awareness of process	Does the organisation's Executive Board recognize programmes and projects and run an informal list of its investments in projects?	Does the organisation recognize programmes and run them differently from projects?	Does the organisation recognize projects and run them differently from its ongoing business?
Level 2 – repeatable process	Does the organisation ensure that each programme and/or project in its portfolio is run with its own processes and procedures to a minimum specified standard?	Does the organisation ensure than each programme is run with its own processes and procedures to a minimum specified standard?	Does the organisation ensure that each project is run with its own processes and procedures to a minimum specified standard?
Level 3 – defined process	Does the organisation have its own centrally controlled programme and process processes and can individual programmes and projects flex within these processes to suit particular programmes and/or projects?	Does the organisation have its own centrally control programme processes and can individual programmes flex within these processes to suit the particular programme?	Does the organisation have its own centrally controlled project processes and can individual projects flex within these processes to suit the particular project?
Level 4 – managed process	Does the organisation obtain and retain specific management metrics on its whole portfolio of programmes and projects as a means of predicting future performance?	Does the organisation obtain and retain specific measurements on its programme management performance and run a quality management organisation to	Does the organisation obtain and retain specific measurements on its project management performance and run a quality management organisation to

Maturity Level	Portfolio Management	Programme Management	Project Management
		better predict future performance?	better predict future performance?
Level 5 – optimized process	Does the organisation run continuous process improvement with proactive problem and technology management for the portfolio in order to improve its ability to depict performance over time and optimize processes?	Does the organisation run continuous process improvement with proactive problem and technology management for programmes in order to improve its ability to depict performance over time and optimize processes?	Does the organisation run continuous improvement with proactive problem and technology management for projects in order to improve its ability to depict performance over time and optimize processes?

Figure 6 - P3M3 Maturity Level Descriptors

The other key feature of this model is that there is no interdependency between the three models for project, programme and portfolio allowing the models to be applied independently. Within each of the models there are seven (7) Process Perspectives which are assessed including,

1. Management control
2. Benefits management
3. Financial management
4. Stakeholder management
5. Risk management
6. Organisational governance
7. Resource management

P3M3 provides detailed descriptors for each of the seven processes for each of the five (5) levels for each of the three (3) models.

The P3M3 model can be administered as a self-assessment or through a certified assessor. The self assessment tool was released after the instrument design for consideration in this study was created and approved by the Bond Human Research Ethics Committee. Additionally, to date there have been no academic research studies published in the project management journals that validate the use of this model or the

self-assessment instrument. The determination for assessment instrument selection in this study includes the requirement for instrument validity to be proven. It is not the intention of this study to develop new instruments or prove the validity of new instruments rather to use proven tools from across the fields of project management and psychology to explore the interaction and results of the two fields. Thus, although a model with merit and an available self-assessment instrument the P3M3 model is determined to be unsuitable for this study.

2.4.5 Other models

a. Project Management Maturity (PMM) model

The PMM reported by Vandersluis (2004) is another example of one of the many available maturity models for project management. As with many of the maturity models available for organisational project management no research foundations or validation studies have been conducted using this model. This lack of research has resulted in this model being removed from consideration for use in the current study however it provides additional support for the use of the five-point scale as an industry standard for organisational maturity assessment.

The Project Management Maturity (PMM) model uses a five point scale to measure organisational maturity:

- Level 1: Ad hoc
- Level 2: Planned
- Level 3: Managed
- Level 4: Integrated
- Level 5: Sustained

The levels are defined as

"**Ad-hoc** is the level most organisations fall into. This means project management occurs on a project-by-project basis, in a non-standards manner.

Planned means there is some standard for the planning aspect of project management, but that tracking the project is done on a project-by-project basis.

Managed indicates there is some normalization of how projects are both planned and tracked.

Integrated means there is a method that brings the project management process and data together for all projects in the organisation.
Sustained means there is a reiterative process that self-corrects, self-improves and is self-sustaining." (Vandersluis, 2004 ,13-14)

h. PM Solutions PM Maturity Model

PM Solutions developed an in-house project management maturity model based on a two-dimensional framework. The first dimension reflects the level of maturity and is based on CMM and the second dimension depicts the key areas of project management addressed based on the nine (9) knowledge areas of the PMBoK®Guide. These nine (9) areas are decomposed into 42 key components. The model uses a five level scale for measuring maturity. The scale is defined as follows:

"1. Initial process
"Recognition that there are project management processes, they are not established practices or standards and individual project managers are not held to specific accountability by any process standards. Documentation is loose and ad hoc."

2. Structure Process and Standards
"Many project management processes exist in the organisation, but they are not considered an organisational standard. Documentation exists on these basic processes. Management supports the implementation of project management, but there is neither consistent understanding, involvement, nor organisational mandate to comply for all projects"

3. Organisational Standards and Institutionalized Process
"All project management processes are in place and established as organisational standards. These processes involve the clients as active and integral members of the project team. Nearly all projects use these processes with minimal exception"

4. Managed Process
"Projects are managed with consideration to how the project performed in the past and what is expected for the future. Management uses efficiency and effectiveness metrics

to make decisions regarding the project and understands the impacts on other projects. All projects, changes, and issues are evaluated based upon metrics from cost estimates, baseline estimates, and earned value. Project information is integrated with other corporate systems to optimized business decisions. Processes and standards are documented and in place to support the practice of using such metrics to make project decisions."

5. Optimizing Process

"Processes are in place and actively used to improve project management activities. Lessons learned are regularly examined and used to improve project management processes, standards, and documentation. Management and the organisation are not only focused on effectively managing projects but also on continuous improvement. The metrics collected during execution are used to understand the performance of not only a project but also for making organisational management decisions for the future"" (Pennypacker and Grant, 2003)

Pennypacker and Grant (2003) conducted a web survey to determine the level of PM maturity across a wide range of industries, to compare the levels of PM maturity between selected industries and to compare the levels of PM maturity between organisations of varying size using the PM Solutions Project Management Maturity Model. The study has a sample size of 123. Each respondent was asked to select with of the 5 levels described their organisation.

Pennypacker and Grant (2003) found that 67% of respondents indicated that their organisations were operating at level 1 (13.7%) or 2 (53.2%), 19.4% reported level 3, 7.3% reported level 4 and only 6.5% reported level 5. No statistical difference found between industries or between organisational sizes.

i. Project Management Maturity (ProMMM)

The Project Management Maturity Model (ProMMM) (Hillson, 2003) uses four levels of increasing project management capability (Naïve, Novice, Normalised and Natural), with each ProMMM level further defined in terms of four attributes, namely culture, process, experience and application.

The structure of the ProMMM uses concepts from existing models such as the Capability Maturity Model Integrated (CMMI) and the EFQM Excellence model from the European Foundation for Quality Management. It also draws on a previously published model developed to assess organisational risk management capability (the Risk Maturity Model). The ProMMM is based on the empirical experience of the developers in providing project management consultancy across a wide range of industries over many years. Although the developers state that *"The lack of an academic research base is not felt to be a disadvantage, as ProMMM represents the accumulated wisdom and expertise of project management professionals who are leading practitioners in the field."* (Hillson, 2003, 300) this lack of research has ruled this model out of contention for use in the current study.

The ProMMM assessment organisation's project management capability can be undertaken using two approaches: a perception based questionnaire, and structured interviews with key staff. For each attribute, a series of questions in the ProMMM Questionnaire addresses respondents' perception of the degree to which their organisation manages projects effectively. A range of potential answers are provided for each question aligned to each of the four levels in the model.

ProMMM Levels are defined as follows:

1. ***Naive***

- Organisation is unaware of the value of using projects to deliver business benefits
- Has no structured approach to project management
- Management processes are repetitive and reactive with little or no attempt to learn from the past or to prepare for future threats or uncertainties

2. Novice

- Organisation has begun to experiment with project management
- No formal or structured generic processes in place
- Aware of the potential benefits of a structured approach to managing projects
- Has not implemented project management processes and is not gaining the full benefit

3. Normalised

- Project management is implemented across all aspects of the business

- Generic project management processes are formalised and widespread, and the benefits are understood at all levels of the organisation (although they may not be fully achieved in all cases)

4. Natural

- Fully project-based culture
- Best practice approach to PM in all aspects of the business
- Project-based information is actively used to improve business process and gain competitive advantage

The four (4) attributes within each level include:

1. Culture

- Mindset
- Ethos
- Belief structure

2. Process

- Methods
- Tools
- Techniques

3. Experience

- Individual and corporate
- Extent to which PM and practice are understood

4. Application

- Effectiveness of actually doing it

2.4.6 Summary

The analysis of the various organisational and project management specific maturity models has determined that none of the currently available assessment tools are suitable for the current research. The OPM3 and CPQ tools are proprietary and must be administered by trained assessors. This research is using a methodology (see Chapter 4 for details) based on a self evaluation of the critical factors. Introducing an element of assessor administered assessments would create an inconsistency in the

method of data capture. Also both tools are too lengthy and detailed in their evaluation of project management maturity to make them practical for the current study.

The remaining project management maturity models are relatively untested and unfounded in valid research which calls their reliability into question. There is no clear research results to date demonstrating that the assessment of maturity using the instruments discussed above is accurate in itself or more accurate than a single self assessment question on the perception of organisational maturity by individual project managers.

The single common element across all of the models evaluated is the notion of a ladder of maturity where organisations develop from one level of capability to a higher one over time (Anderson and Jessen, 2003, 459). Although the number of rungs on the ladders vary ranging from three (3) to five (5) the most commonly used and tested array is the five (5) step definitions used in CMMI. For the purposes of the current study a single self-assessment evaluation question on organisational project management maturity is used to measure the perceived (rather than actual) level of overall project management maturity of the organisations in which the subjects are working. The inherent assumption is that the perceived maturity levels are as powerful on the individual psyche as actual project management maturity (Mineka and Henderson (1985) quoted in (Endler et al., 2000). This assumption is an extension of the theory of perceived control where the effects of perceived control have been found by researchers to have similar effects as when subjects have actual control. See Chapter 3 for more details. This approach was used successfully by Crawford (2000b) in her research into the assessment of project manager competence as well as Aitken and Crawford's (2006) research.

3 COPING

3.1 Introduction

This chapter explores the concept of stress and the theoretical models for coping with stress that have been developed as our understanding of stress has evolved from being an external event that provokes a physical response through to an internal cognitive process of balancing external demands with internal resources. Although the idea of physical reactions to stressors remains current, the psychological aspect of stress and stress management has evolved through the exploration by researchers of the internal cognitive rather than physical processes that manifest in the coping process.

The field of stress and coping research has many studies focusing on the coping patterns of individuals facing a common stressor such as a specific illness (e.g. diabetes, cancer) (Benight et al., 2001, Karlsen and Bru, 2002, Kim et al., 2002, Fillion et al., 2002, Arraras et al., 2002, Luszczynska et al., 2005b) or a specific job related stressor such as police officers (Patterson, 2003) or nurses (Brown and Edelmann, 2000, Khodadadi et al., 2008). Within the business community a number of studies have been conducted exploring the nature of stress and coping for managers. These studies are generally focused on health outcomes for managers, focusing on the negative health outcomes of poor stress management such as high blood pressure, anxiety and other aspects of poor health (Seegers and van Elderen, 1996, Peter and Siegrist, 1997, Ghorbani et al., 2000, Bech et al., 2005). Other studies have included examinations of cross cultural differences in personality factors and health outcomes (Richardson and Tang, 1986, Ghorbani et al., 2000, Bhagat et al., 2001, Kirkcaldy et al., 2002, Lu et al., 2005), gender based studies of perceptions of stress and coping strategies (Cooper and Davidson, 1982, Long, 1993b, Portello and Long, 2001, Iwasaki et al., 2004) and the effect of work based stress on job satisfaction (Parasuraman and Cleek, 1984, Long, 1998, Cavanaugh et al., 2000, Lu et al., 2005, Mohr and Puck, 2007). Within the specific field of project management there are very few published studies on stress as related to the project manager or project management. The seminal articles focus on the sources of stress for individuals and teams within projects (Sommerville and Langford, 1994, Lysonski et al., 2002, Gällstedt, 2003, Zika-Viktorsson et al., 2006). This study seeks to explore the unique landscape of how project managers cope with specific events they define

as stressful at work (which may or may not be project related), at home and with their personal health, with specific interest in exploring the relationship between the project management culture and the way in which project managers choose to cope with stressful situations across the scope of their lives.

3.2 Theories of Coping

For centuries humans have "coped" with life and adversity but until recent times the exact nature of how we do this had not been understood or explored. The exploration of *coping* began with Selye's (1952, 1955, 1993) work in studying animals and their physical adaptations to "stressful" events which lead to the formulation / identification of the General Adaptation Syndrome. Following Selye's work with physiological reactions to stress, researchers moved towards investigating psychological reactions to stress. The first major school of thought from this exploration produced a range of psychoanalytic ego psychology models. These models defined coping as "realistic and flexible thoughts and acts that solve problems and thereby reduce stress." (Lazarus and Folkman, 1984a, 118) These models generally take the form of a hierarchy with the higher levels containing coping responses thought to be more mature and effective becoming progressively less so as you move down the levels. Another major model to emerge from this area of research was the Transactional Theory of Coping proposed by Lazarus and Folkman (1984a). This model removes the association between coping responses and their effectiveness, thereby widening the scope of possible inclusion (of coping responses) within the bounds of psychological stress. This model is based on cognitive appraisal and reappraisal of stressful events and the application of a range of coping strategies in response to potentially threatening or harmful situations. This theory forms the foundations for the research being reported in this thesis.

3.2.1 General Adaptation Syndrome (GAS)

The research into the field of stress began with the study of animals and their reactions to noxious agents. In his early years as a medical student Selye (1993) noticed that the patients he studied had a range of different diseases but all displayed a similar set of core "sick" symptoms e.g. loss of weight and appetite, loss of ambition and diminished muscular strength. His later research led to the discovery that all toxic substances introduced to an animal body produce the same pattern of response. They

all responded with adrenal enlargement, gastrointestinal ulcers, and thymicolymphatic shrinkage. These three factors become the objective indicators of stress and formed the basis of the *General Adaptation Syndrome (GAS) or biologic stress syndrome* proposed by Selye (1952).

Selye defines stress as *"the non-specific (that is, common) results of any demand upon the body, be the effect mental or somatic."(1993 ,7)* There are a great variety of stress inducing situations identified by Selye including emotional arousal, effort, fatigue, pain, fear, concentration, humiliation, loss of blood and large and unexpected success. The model proposed by Selye for stress reactions in animals is a three stage process, the first being *alarm reaction* in which the three objective symptoms described above are observed. If the noxious (stress causing) agent is strong enough it will kill the animal in this stage. However, if the animal is able to survive the alarm stage they move on to the second stage, the *stage of resistance*. During this stage many of the physical symptoms are the opposite of those observed in the alarm stage as the animal "copes" or "adapts" to the noxious agent symptoms such as body weight returning to normal. Animals however cannot resist a noxious agent indefinitely. There is a limited amount of resource available to fight these fights and if the noxious agent persists the animal will enter the third stage, *exhaustion* where adaptation is lost and the body can no longer continue.

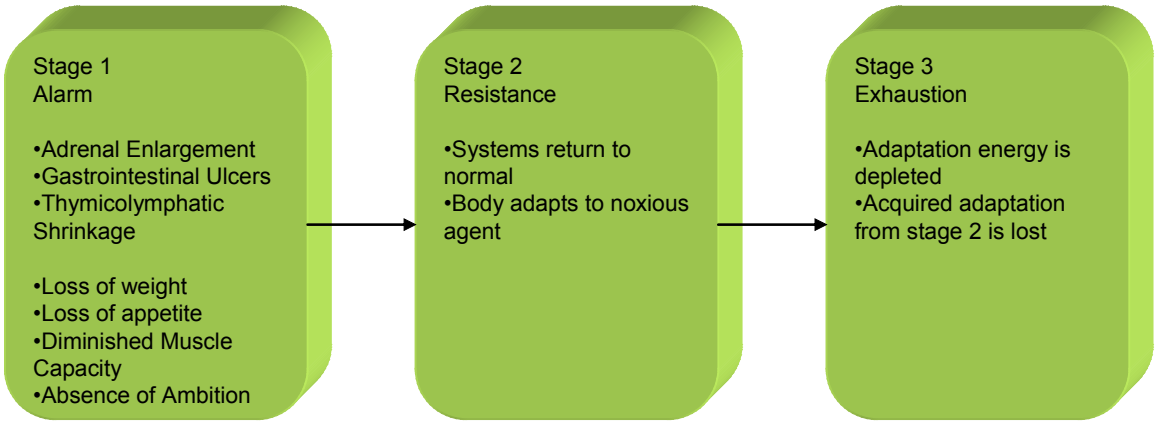

Figure 7 - Selye's Three Stages of Stress and Coping

The physical and chemical reactions observed during the *alarm stage* centre around the endocrine system and are twofold. The first pathway is through the autonomic nervous system. The hypothalamus stimulates the central part of the adrenal glands sending *catecholamines* into the bloodstream, increasing the blood flow, heart rate

and breathing, while inhibiting digestion and increasing visual ability thus "mobilizing the body for action" (Weiten et al. ,76). The second pathway is stimulated by the pituitary glands secreting ACTH (adrenocorticotrophic hormone) which in turn stimulates the outer adrenal glands which then release *corticosteroids.* These increase the release of fats and proteins into the blood stream to increase energy levels.

The body has developed two approaches to dealing or coping with noxious agents both internal and external. They are syntoxic and catatoxic reactions and form the basis for homeostasis. Syntoxic stimuli allow a body to co-exist or tolerate an aggressor while catatoxic stimuli attempt to destroy the aggressor.

3.2.2 Transactional Theory of Coping

In 1966 Lazarus put forward his *transactional theory of coping* which redefined the platform which future studies would use as their starting point. Until this time stress had either been defined as a stimulus, whereby an event was stressful, or a response, in which case a person reacted to an event in a stressful manner. In Lazarus' view stress was more complex than an either/or definition. Lazarus proposed that coping is an interaction between a person and the environment, primarily, that when an individual approaches a situation, a cognitive appraisal process is begun to assess the level of threat and the available coping resources. Folkman and Lazarus further define this theory by outlining a three-stage cognitive appraisal process, Primary Appraisal, Secondary Appraisal and Reappraisal (Folkman, 1984).

Primary Appraisal is the cognitive process of deciding whether you are being threatened or benefited. It answers the question *Am I in trouble or being benefited, now or in the future, and in what way?* Once a situation or event is appraised as threatening or harmful Secondary Appraisal is engaged, addressing the question *What if anything can be done about it?* During Secondary Appraisal a person will look to all possible resources available for reducing the threat or harm and assess their suitability and chances of success. Finally re-appraisals occur continuously as the event unfolds. As an individual interacts with their environment, new information and experiences are added to their spectrum of available resources and reappraisal of the situation occurs. See Figure 8 below.

Lazarus & Folkman have distinguished three (3) kinds of primary appraisal: irrelevant, benign-positive and stressful (1984a ,32). Lazarus & Folkman define psychological stress as being

> "*a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being*" (1984a ,21)

Stress Appraisals are then divided into three (3) types:

1. **Harm/loss** – damage has already been sustained
2. **Threat** – damage is imminent; or anticipated, requires coping responses to be activated and is characterised by negative emotions
3. **Challenge** – similar to threat in that they require coping responses to be activated but are centred on a potential gain and are characterised by positive emotions. (1984a ,32-33)

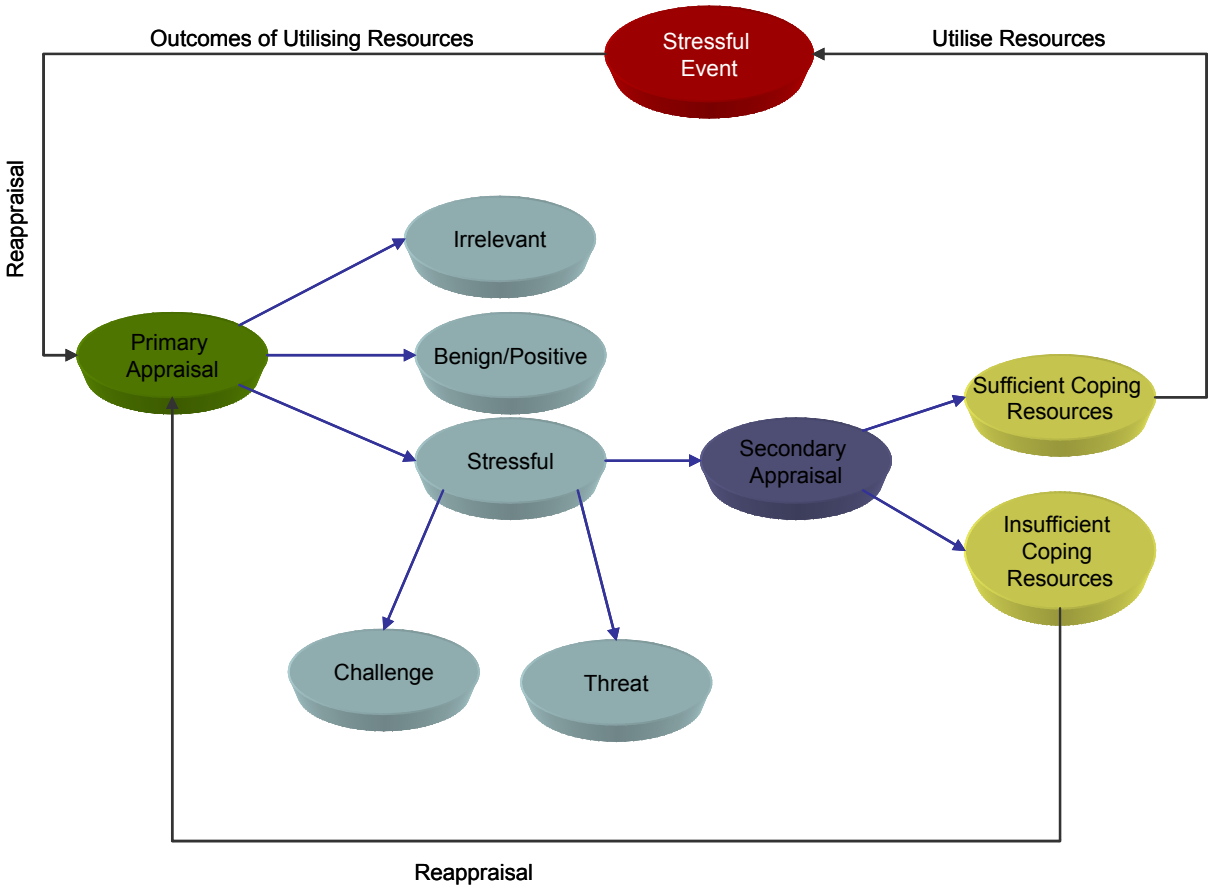

Figure 8 - Lazarus and Folkman's Transactional Theory of Coping

The transactional theory of coping is built on the premise that coping is a process, constantly changing to meet the demands of a specific situation. Lazarus & Folkman define coping as

> *"constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person"* (1984a ,141)

Primary, secondary reactions and reappraisals interact with one another continuously. The process is neither static nor linear. The outcome of how this appraised event is coped with is determined by the coping resources available to the individual and how they are applied.

One of the key features of coping as a process is that it is situational rather than trait based (dispositional). That is to say that it is concerned with the assessment of coping for an individual based on what they actually do or think in coping with a specific stressful event. This concept is expanded in Section 3.3 below. Coping as a process also has an implied longitudinal aspect in that what an individual does or thinks will change over the course of a stressful event and will be influenced by the outcomes of each attempt to utilise a coping resource. That is, it is constrained to those responses to stress that require actual mobilization, excluding automated behaviours. And finally that it does not discriminate based on effectiveness of the resources used or mastery of the situation.

The transaction theory of coping revolutionised thinking on the subject of coping and has influenced the research in this field over the past two decades more than any other concept. It has been widely used as the basis for research into specific areas of coping and stress including: Folkman's research into the role of personal control within the cognitive coping process (1984); Dewe's (1991) use of this theory as the basis for developing a framework for researching work-based stress; numerous studies by Folkman and Lazarus (1985) to observe the evolution of emotion throughout the stages of coping; study of coping strategies employed by a middle aged community residing sample over the course of a year (Folkman and Lazarus, 1980); and the relationship between cognitive appraisal, coping processes and short term outcomes (Folkman et al., 1986). The transactional theory of coping and the results from

subsequent research have also spawned a number of subsequent theories including the Goodness of Fit Theory, which is expanded on in Section 4.2.1.

3.2.3 Summary

The research study reported here uses Lazarus and Folkman's Transactional Theory of Coping as the foundation for the assessment and analysis of coping strategies employed by project managers across multiple life domains including, work, home, and personal health. This research seeks to find patterns in the types and a combination of strategies employed but is not focused on the outcomes of these strategies. Specifically, this research does not look at the effectiveness of coping strategies in reducing or eliminating stress for project managers. This is recommended for exploration in future research projects.

3.3 Coping Strategies

Once the primary appraisal has deemed a situation to be stressful and therefore needing to be coped with, secondary appraisal is engaged to evaluate the available coping resources and select the appropriate coping strategy or strategies that will be deployed to manage the event. Lazarus and Folkman (1984b) developed a two category model for categorising coping strategies: emotion-focused coping strategies and problem-focused coping strategies. These categories have been the foundation for much of the subsequent studies in this field including (Folkman and Lazarus, 1985, Folkman et al., 1986, Karlsen and Bru, 2002, Kim et al., 2002, Patterson, 2003).

Although a popular means for assessing and researching coping, many researchers have found this range of categories to be limiting. Another issue identified by researchers in using this original categorisation is the disproportionate number of strategies assessed in each category. For instance, there are many more general emotion-focused coping strategies than problem-focused strategies. One approach that addresses this issue is that the more situation-specific the research and instruments become the more problem-focused strategies there are (Lazarus and Folkman, 1984b) balancing out the categories. Another approach has been to expand the categorisation framework. Researchers have expanded on the Folkman and Lazarus categorisation in a number of ways. Peacock and Wong (1993) developed a 5 schema approach using problem-focused schema, emotion-focused schema, preventative schema, existential

schema and a spiritual schema. Endler and Parker (1994) developed the 3 scale assessment tool, Coping Inventory for Stressful Situations (CISS), to assess for Emotion-Oriented, Task-Oriented and Avoidance-Oriented coping strategies. Amerkin's (1990) Coping Strategy Indicator (CSI) revealed three factors of Problem Solving, Seeking Social Support and Avoidance. The dominant three categories which are expanded on below have been, emotion-focused coping, problem-focused coping and avoidance-focused coping.

3.3.1 Emotion-Focused Coping

Lazarus and Folkman define emotion-focused coping strategies as "coping that is directed at regulating emotional responses to the problem" (Lazarus and Folkman, 1984b, 150) Lazarus and Folkman go on to explain that the bulk of emotion-focused strategies are aimed at reducing emotional distress and may include strategies such as avoidance, minimization, distancing, selective attention, positive comparisons and wresting positive value from negative events. There are also a number of emotion-focused coping strategies that are aimed at increasing distress. These form a smaller portion of the suite of strategies covered by this category and are used by individuals who need to "feel worse before they can feel better" (Lazarus and Folkman, 1984b, 150). Lazarus and Folkman postulate that these strategies are often used to mobilize the individual into action or problem-focused coping**.**

3.3.2 Problem-Focused Coping

Lazarus and Folkman define problem-focused coping as "coping that is directed at managing or altering the problem causing the distress" (Lazarus and Folkman, 1984b, 150). A large proportion of problem-focused coping strategies are aimed at "defining the problem, generating alternative solutions, weighing the alternatives in terms of their costs and benefits, choosing among them, and acting" (Lazarus and Folkman, 1984b, 152), most of which are directed outward towards an external source of stress. However problem-focused coping can include strategies focused inwards. Lazarus and Folkman suggest that lifting the level of aspiration, reducing ego involvement, finding alternative channels of gratification, developing new standards of behaviour or learning new skills and procedures are inwardly directed problem-focused strategies.

3.3.3 Avoidance-Focused Coping

Although emotion-focused and problem-focused coping have been the predominant categorisation of coping strategies in studies to date, researchers have conducted a number of studies attempting to expand and refine this framework. The predominant addition has been avoidance focused coping.

Endler and Parker's (1994) created the Coping Inventory for Stressful Situations (CISS) assessment scale. This assessment uses the three factor model of emotion-oriented, task-oriented and avoidance-oriented coping. In their factor analysis study of the CISS using a large college student sample, Endler and Parker found that all the Task-Oriented items loaded uniquely to the Task Factor and all the Emotion-Oriented items loaded uniquely to the Emotion Factor. However the Avoidance-Oriented items did not load uniquely. Two items; try *to go to sleep* and *treat myself to a favourite food or snack* did not load to the Avoidance Factor. McWilliams et al. had similar results. Strong support was found for the Task and Emotion-Oriented factors but there was weaker support for the Avoidance Factor (McWilliams et al., 2003). The weaker results for the avoidance scale provide doubt as to whether the extension of the Lazarus and Folkman dichotomy of emotion and problem-focused coping in this manner is valid.

Another use of avoidance-focused coping strategies has been to split the existing structure of problem and emotion focused coping into approach and avoidant strains. Terry and Hyne (1998) used a four category structure of problem-management, problem-appraisal, approach-emotion and avoidant-emotion coping strategies. Chang (1998) used a multi-level categorisation where the tertiary level consisted of two items defined as Engagement (approach) and Disengagement (avoidance). Moos and Schaefer (1993) used a four item categorisation of cognitive-approach, behavioural-approach, cognitive-avoidance and cognitive-approach coping. The issue of which dimensions best capture the scope of coping strategies that are employed to manage stressful situations has been one that has challenged researchers. It has resulted in a number of models being posed by researchers such as the ones described in this section. This is an area of research that continues to be developed. Section 3.4 elaborates on how assessment instruments have been created to balance the

complexity of coping strategy selection and the need to make assessments effective and efficient.

3.3.4 Summary

The predominant categorization of coping strategies has been in the dichotomous emotion-focused versus problem-focused format. Attempts to refine or expand on this basic grouping have met with mixed results with no clear and agreed alternative model. In analysing the research into this field as well as the available assessment instruments the hypotheses in this research are based on the traditional two (2) category model with the expectation that project managers will demonstrate a greater reliance on problem-focused coping strategies across all three (3) domains of work, home and personal health stressors. It is also hypothesized that project managers will demonstrate a greater sense of situational specific perceived control over their stressors as well as a higher generalised self-efficacy in regards to positive beliefs in their ability to cope effectively both of which will be positively correlated to higher usages of problem-focused coping.

3.4 Situational Vs Dispositional Coping

There have been two general approaches to measuring coping strategies: the first, measuring actual coping strategies employed within real situations, i.e. “what did you do to cope” and the second, seeking out copying styles employed by individuals across multiple situations i.e. “what do you normally do to cope”. The former is known as situational or state based coping and the later dispositional or trait based coping.

3.4.1 Situational Coping

State or situational coping is defined as being “an individual's responses when confronted with a specific situational stressor" (Fillion et al., 2002 ,19). Folkman and Lazarus’ transactional theory of coping is based on the premise that each situation is approached anew by an individual and the coping strategies employed are the direct result of the situation specific cognitive appraisal process unique to that moment in time.

Folkman and Lazarus use the term "process-oriented coping" which is centred on the three concepts of, what a person actually does in a specific situation and how the coping changes as the situation unfolds (1984a ,142). In later work by Folkman et al. the core feature of process-oriented coping is that

> *"the context is critical in the process-oriented approach because coping is assessed as a response to the psychological and environmental demands of specific stressful encounters."* (Folkman et al., 1986, 992)

In Folkman and Lazarus' transactional theory of coping, repeat usage of similar coping strategies in various situations could be said to be the result of a consistent cognitive appraisal of differing situations rather than the utilization of coping styles or traits. However, patterns of consistent use of coping strategies are evident even within Folkman and Lazarus' own work. Folkman et al's (1986) longitudinal study into the coping strategies of 75 white couples over 6 months found a tendency for problem-focused coping strategies to be used when coping with work-based stressors. Using a situational and process-oriented approach to analysing these coping patterns, such broad consistencies in coping strategies cannot be fully explained without considering that individuals learn to cope in defined patterns through mastery experiences and are influenced by cultural norms (Lazarus and Folkman, 1984b). Patterns emerging from coping, even at a high level may indicate that individuals cope within predefined coping patterns based on stressor type.

3.4.2 Dispositional Coping

The terms "coping style", "trait coping" and "dispositional coping" have been used in various ways to describe a broad range of behaviours. The two most frequently used definitions are, "relatively consistent coping behaviours used by individuals across a wide variety of situations"; (Anshel, 1996, Fillion et al., 2002, O'Connor and Shimizu, 2002) and as a personality construct with relatively permanent and enduring qualities:

> *"the search for coping dispositions is a search for consistent ways of coping as used by a given person or persons, in short, a comparatively stable property of the personality that disposes a person to react in one or another way to a stress stimulus."* (Lazarus, 1961 , 252)

However, Karlsen and Bru (2002) in their research into diabetes-related coping styles clearly define diabetes-related coping styles as, “habitual coping when dealing with diabetes-related strains” and specifically, that they are not stable personality traits. This distinction was based on previous research by Murberg et al (2002) which showed coping traits to be less stable than personality traits.

Carver et al describe the concept of coping styles as a view based on the presumption that “people do not approach each coping context anew, but rather bring to bear a preferred set of coping strategies that remains relatively fixed across time and circumstances" (Carver et al., 1989, 270). In Stone and Neale’s (1984) longitudinal study of coping styles it was found that when the same problems were encountered by the subjects they tended to consistently use the same coping strategies.

3.4.3 Summary

The findings from this section show that there are merits to both dispositional and situational views on coping. The underlying assumption that people cope to “type” has a synergy with the research questions posed in this study however it does not offer, on its own, the ability to investigate the specific hypothesis that project managers actually use similar coping strategies in a variety of stressful situations. In addition the Transactional Theory of Coping selected for use in this study, as described in Section 3.1 above, is based on the assumption that each stressful event is approached anew with limited relationship with previous stressful events. The cognitive process that ensues is a direct and situationally determined interaction of person and environment. In keeping with both these notions the current study uses a situation specific research design to test the hypothesis that project managers use more problem-focused coping strategies when dealing with work, home and personnel health stressors by exploring actual coping strategies engaged in specific events. However, in designing the study and contemplating the contribution to knowledge that this study is to make, it was deemed appropriate to test the hypothesis along with the coping strategy selection and primary appraisal assessment tools with a small sample to ensure that the tools were useable, the data analysable and that the basic premise for the hypothesis had merit. In doing so it was decided that a rapid assessment of the dispositional coping strategies of project managers would provide

the required assurance of hypothesis validity prior to embarking on the full data gathering and analysis process. The results are detailed in Chapter 5 below.

3.5 Coping Measurement Instruments

Coping, both dispositional and situational, has primarily been measured through the use of self report instruments. There are a number of measures that have been developed and applied across various samples. The first of these self-report measures to be developed was the Ways of Coping Questionnaire, developed by Lazarus and Folkman (1984b) as part of their initial research using their *transactional theory of coping.* The Ways of Coping Questionnaire (WOCQ) was designed to assess coping strategies based on the two factor model of emotion and problem-focused coping. This tool was the first of a number of self-report tools that have been developed to assess coping strategies. This and others are expanded on in this section.

The theories of coping and the methods of assessment have often times been contradictory. According to Livneh et al (1996), in theory researchers have viewed coping as a dynamic process, such as Folkman & Lazarus' process oriented-coping but have measured coping as a static construct (style or trait). Livneh et al go on to say that further to this contradiction, theory has often viewed coping as triggered by situational factors but measured by personality traits and generalised beliefs (1996, 501-502). These contradictions highlight the complexity of the coping construct and its application across situations.

Folkman and Moskowitz also critique the available self-report inventory based assessment tools and warn of the following limitations that should be considered when conducting research:

- potentially burdensome length
- inadequate sampling of coping inherent in checklist approaches and response keys that are difficult to interpret
- variations in the recall period
- changes in meaning of a given coping strategy depending on when it occurs
- unreliability of recall

- confounding of items with their outcomes (Folkman and Moskowitz, 2004, 748-749)

Another common criticism of the self report assessment tools which is highlighted by Folkman and Moskowitz is that of retrospective reporting. The first issue with recall is the accuracy of recall at any time but over a week, a month or a year the recall ability of a subject will alter enormously. However, although memories may fail over time and hindsight may cloud the responses, many coping strategies can only be identified in hindsight and while if asked to report on coping strategies being employed during a stressful situation, important strategies may be left out as well. The second issue is the time frame selected for each study. If a long time frame is selected candidates may be reporting on something occurring 12 months ago or 2 days ago. Without specific instructions and tight time bands variations within samples may cause distortions.

3.5.1 Ways of Coping Questionnaire

In conducting their research, Folkman and Lazarus developed an assessment tool, the Ways of Coping Questionnaire (WOCQ). The WOCQ is designed to identify emotion-focused and problem-focused coping strategies. This tool has been widely used by a number of researchers including Patterson's (2003) work with police officers, Long's (1993a) exploration of coping strategies of male managers and Hee-Seung Kim et al's (2002) research into coping strategies of Korean cancer patients.

The Ways of Coping Questionnaire has undergone a number of revisions since its inception. The current version of the WOCQ includes 67 individual questions designed to assess situational coping using a 4-point scale, "Do Not Use", "Used Somewhat", "Used Quite a Bit" and "Used a Great Deal" (Folkman, 1984). See Appendix A for the full assessment tool.

However in the many studies to date that have used this assessment tool, the factor analysis results have been varied. These variations led Stone et al to conduct an analysis of the WOCQ to examine the applicability of WOCQ coping items to specific problems, the stage or stages of the stressful event for which coping was reported, and the meaning of the response key used with WOCQ coping items. Stone et al's

findings in regard to using the WOCQ for specific problems suggest that some of the scales may vary in the number of items that are *"potentially applicable or relevant to particular kinds of problems and that there may be ceiling effects when certain scales are used to assess coping with particular problem types".* (Stone et al., 1991, 654)

The conclusion from the effects of multiple stages of a stressful event on the responses gained from the use of the WOCQ was that researchers would benefit from clearly identifying the stage(s) of the event that the subjects should consider when responding to the questionnaire as the effect of stage choice was significant on the results.

Another issue highlighted in the Stone et al research was the misinterpretation of the scale by subjects. Stone et al found that the subjects in their study tended to respond to the items based on the extent the dimension was useful in dealing with the stressful event rather than purely whether they employed the strategy or not. (Stone et al., 1991, 657)

3.5.2 COPE

In response to a number of perceived deficiencies both in the methods for developing the existing assessment tools and the varied results from the application of these tools Carver et al (1989) conducted a theoretically based approach to the development of a new self assessment tool for the assessment of both dispositional and situational coping.

Carver et al posited that although the emotion-focused/problem-focused approach to coping was important it was too simple. The variations in factors reported from research using the Ways of Coping Questionnaire, the predominant assessment tool being used at the time, were cited as evidence of this over simplification (Carver et al., 1989). Carver et al. go on to outline three key reasons why a new assessment tool was required. The first argument given is that although the diversity in what is measured by existing instruments is evident none of them assessed all of the specific domains that were felt to be of theoretical interest. Secondly the items used in existing scales were unclear at times and in some cases where seen to include multiple concepts in a single item that were either distinct or conflicting. The third and final

argument questions the development methods used for creating and validating existing instruments, specifically that existing methods have been developed empirically not theoretically using factor analysis to determine the underlying scales. As such Carver et al. state that "the scales tend to be linked to theoretical principles only somewhat loosely and post hoc."(Carver et al., 1989) A similar criticism has been made by both Endler and Parker (1994) and Amirkan (1990) in the development of their coping strategy assessment tools the CISS and CSI.

The final COPE instrument has 13 scales and 60 questions. See Appendix A for full assessment tool.

- **Active Coping** - the process of taking active steps to try to remove or circumvent the stressor or to ameliorate its effects
- **Planning** - thinking about how to cope with a stressor. Planning involves coming up with action strategies, thinking about what steps to take and how best to handle the problem.
- **Suppression of Competing Activities** - putting other projects aside, trying to avoid becoming distracted by other events, even letting other things slide, if necessary, in order to deal with the stressor.
- **Restraint Coping** - waiting until an appropriate opportunity to act presents itself, holding oneself back and not acting prematurely.
- **Seeking Social Support for Instrumental Reasons** - seeking advice, assistance or information
- **Seeking Social Support for Emotional Reasons** - getting moral support, sympathy or understanding
- **Focusing on and Venting Emotions** - tendency to focus on whatever distress or upset one is experiencing and to ventilate those feelings
- **Behavioural Disengagement** - reducing one's efforts to deal with the stressor, even giving up the attempt to attain goals with which the stressor is interfering
- **Mental Disengagement** - variation of behavioural disengagement, postulated to occur when behaviour disengagement is prevented
- **Positive Reinterpretation and Growth**
- **Denial** - refusal to believe that the stressor exists or trying to act as though the stressor is not real
- **Acceptance** - opposite of denial

- **Turning to Religion**

Carver et al (1989) validated the COPE in both a dispositional study and a situation specific study. The dispositional study was conducted on 978 students. Factor analysis using a varimax rotation found 11 factors. Active coping and planning loaded together and the two forms of social support loaded together. Mental disengagement and positive reinterpretation and growth both had weak loadings and alcohol and drug usage didn't load at all. Cronbach alpha reliability scores were high for all scales except mental disengagement. The scales in general were not strongly correlated. The implications of this are that people dealing with stress use a wide range of coping strategies and that because the tendencies are separable empirically their effects should be able to be studied separately.

The situational study required subjects to recall their most stressful event, describe it and rank its importance to them. Factor analysis yielded similar results to the dispositional study except that the loading for mental disengagement was higher. Cronbach alphas were higher than in the dispositional study suggesting that the subjects had greater internal consistency when dealing with an actual event than when reporting on general coping. Subjects reported using less active coping, seeking of instrumental social support, positive reinterpretation and growth, turning to religion and mental disengagement than in the dispositional study. The more a situation mattered to a subject the more the subject reported focusing on and venting emotions, engaging in denial and seeking social support (both forms). Those who saw the situation as amenable to change reported engaging in more active coping, planning, suppression of competing activities and seeking instrumental social support, those who reported the situation as not amenable to change reported higher levels of Acceptance and Denial. Most of the dispositional coping dimensions correlated at a low to moderate level with the situational coping dimensions.

Much of the research to date has shown that people utilise a range of coping strategies to manage every stressful event (Folkman and Lazarus, 1980, Folkman et al., 1986, Endler et al., 2001) however Anderson's (1977) study into managerial locus of control, perceived stress and coping behaviours, found that subjects were inclined to either use task or emotion focused coping rather than a mix. Although a wide range of

strategies are used the emphasis alters from situation to situation. Folkman et al (1986) in their study of 75 couples to examine the relationship between cognitive appraisal, coping processes and short term outcomes found that situational differences influenced the dominant coping strategy used. For example a threat to self-esteem resulted in a greater use of confrontive coping, self-control, acceptance of more responsibility, more social support being sought and more escape-avoidance as compared to when the threat to self-esteem was low. However a threat to a goal at work resulted in more self-control and planful problem solving. These variations would account for the low correlation between the dispositional and situational coping strategy results found by Carver et al (1989). This research looks at the correlation between the dispositional coping strategies of project managers as compared to the situational coping strategies applied during a range of stressful situations both in a work, home and personal environment. The results are expected to be consistent with those found by Carver et al.(1989).

The COPE has been used in a number of subsequent studies by other researchers. These studies have reported relatively consistent results from factor analysis and internal consistency co-efficients. Karlsen and Bru (2002) in their study of coping styles among adults with both types (1 & 2) of diabetes found an eight factor solution which accounted for 49.5% of the total variance. Hudek-Knezevic et al (1999) conducted a comparative analysis of the Croatian COPE and the original COPE using a dispositional approach. They found that the structure of the coping dimensions were fairly similar for both the original and Croatian COPE. Acceptance, positive reinterpretation and restraining of coping activities had much higher loadings on the same factor scale as planning and active coping. This could possibly be explained by the differing nature of stressors in Croatia to the USA, Croatia having more uncontrollable events.

Further validation of the construct validity of the COPE can be found in the critique of available tools, specifically the WOCQ by Stone et al. They concluded that “In fact, a trait coping questionnaire with excellent psychometric properties has recently been developed by Carver, Scheier, and Weintraub." (Stone et al., 1991, 648)

3.5.3 Brief COPE

Coping strategy assessment tools have traditionally been long and time-consuming to administer, particularly when situational coping strategies have needed to be assessed across a number of situations. In response to this, Carver (1997) developed the Brief COPE. To create the shortened version, the four items on each scale were reduced to two using the following criteria:

1. There must have been a high loading on the relevant factor in the original factor analysis
2. Each item's clarity and ease of communication to non-student population based on field experience was examined

Three scales were modified for clarity

- Positive Reinterpretation & Growth became "Positive Reframing"
- Focus on and Venting of Emotions became "Venting"
- Mental Disengagement became "Self-Distraction"

One scale was added "Self-Blame"

The final assessment tool contains 28 questions across 14 scales. A validation study was conducted by Carver et al. (1997). A nine factor solution accounted for 72.4% of the variance. Four a priori scales formed distinct factors: Substance Use, Religion, Humour and Behavioural Disengagement. Use of Emotional Support and use of Instrumental Support loaded together (as in the original COPE). Active coping, Planning and Positive Reframing also loaded together, as did Venting & Self-Distraction and Denial & Self-Blame. Acceptance and Active Coping loaded on individual factors. The Cronbach Alpha reliability indicators all exceeded the minimum requirement of 0.50 and all but Venting, Denial and Acceptance exceeded .60. Although the results of the factor structure are not perfect they are relatively similar to the original COPE and the reliability scores are exceptionally high.

The Brief COPE has been validated in a number of subsequent studies with relatively consistent results. One such study by Fillion et al (2002) conducted a validation of the Shortened COPE with a sample of breast cancer patients undergoing radiation therapy. Fillion et al used the shortened version of the COPE to assess situational coping. They found that the test-retest and Cronbach Alpha internal consistency reliability coefficients of the French-Canadian shortened COPE were higher than

those reported in the full-length version of the instrument. The French-Canadian study's factor analysis revealed eight factors. These correlated in a theoretically meaningful manner with the existing measures of coping skills and illness, "suggesting good construct convergent and concurrent criterion validity" (Fillion et al., 2002).

3.5.4 CISS – Coping Inventory of Stressful Situations

Endler and Parker (1994) in their review of the existing assessment tools for identifying coping strategies determined the existing tools to be too simple for the assessment of complex coping behaviours. They developed the Coping Inventory of Stressful Situations (CISS) which was designed to broaden the scope of the assessment from emotion and problem-focused coping strategies to include avoidance-focused coping.

Endler and Parker also identified a number of weaknesses in the current suite of available tools. Many of their arguments are consistent with those of other researchers including Stone et al (1991) and Carver et al (1989). Endler and Parker encapsulate their reasoning in that

> *"relatively few reliable and valid coping scales have been developed .....many of the most frequently used coping scales suffer from a variety of weaknesses: poor reliability, poor validity, inappropriate or incorrect use of factor analytic techniques, failure to cross-validate coping measures with different populations, failure to clearly distinguish stylistic (trait-like) measures of coping activities from situation-specific (state-like) coping measures, and a failure to take into account potential gender differences...Integration of research findings in the coping area has probably been impeded by psychometric problems with widely used scales."*
> (Endler and Parker, 1994, 50)

In 1990 Endler and Parker developed the CISS. The first stage of development included the generation of items representing a diverse set of coping responses and a total of 70 items were listed. It was administered to 559 undergraduate students who were asked to indicate how much they generally engaged in the various activities when dealing with stressful situations on a 5 point Likert scale. Factor analysis using

varimax rotation revealed three factors, Task, Emotion and Avoidance-Oriented coping. Separate factor analysis of male and female responses produced almost identical results. At this stage the number of items on each scale was reviewed and a new 66 item list was administered to 394 college students. Varimax rotation again found a three factor solution. A 48-item measure was then developed by removing all items that loaded .35 or above on two or more factors and those that did not load .35 or above on any of the factors and those that had poor face validity. The current scale has 16 items on each of the 3 scales, task, emotion and avoidance.

Further validation studies found identical factors when adult and college samples were compared with a sample of 302 psychiatric inpatients. Separate factor analysis of the Avoidance scale found 2 sub-scales; 8-item distraction scale and 5-item social diversion scale. And finally the 6-week test re-test reliabilities were found to be adequate in a sample of 74 male and 164 female undergraduates. Further "the constructs of task-oriented, emotion-oriented and avoidance-oriented coping relate specifically to three very different and potentially conflicting coping styles. The correlations between the CISS Task scale and the other scales were low or non-significant in both samples. Correlations between the CISS Emotion scale and the avoidance-related scales were low to moderate in both samples" (Endler and Parker, 1994, 52)

In 1994 an analysis of the factor structure of the CISS was conducted by Endler and Parker in a study involving a sample of 832 college students (1994). This study found that the CISS task items loaded uniquely on the Task factor. The CISS emotion items loaded uniquely on the Emotion factor. Two items from the Avoidance items did not load uniquely to the Avoidance factor, *try to go to sleep* and *treat myself to a favourite food or snack.* The factors found were almost identical to those found by Endler and Parker 1990 with Cronbach Alpha Coefficients in the high range of .76 to .92.

McWilliam et al (2003) conducted a study with a sample of clinically depressed individuals to evaluate the factor structure of the CISS, to examine the relationship between coping strategies assessed by the CISS and both personality and emotional distress and to evaluate the incremental validity of the CISS. The results showed that there was strong support for factor validity of the emotion-focused coping and task-

oriented coping scales however there was less support for the avoidance-oriented coping scale. However there was support for the concept that there are separate Distraction and Social scales, rather than a single Avoidance scale. McWilliams et al suggest that in future revisions of the CISS the Avoidance scale might be considered for deletion and the three items that are not part of either of the Distraction and Social scales might be eliminated (McWilliams et al., 2003, 435). For the analysis of incremental validity McWilliams et al found that neuroticism and emotion-focused coping were found to be positive predictors of depression. Distraction was found to have a negative association with anxiety and there was no support for the incremental validity of the task-oriented coping or social coping scales.

3.5.5 Summary

In the analysis of available coping assessment instruments a number of issues have been identified by researchers and various attempts at amendments have been made. In choosing an instrument for the current research the key determining factors are: consistent factor analysis results across a range of sample populations, high internal consistency coefficients, ability to use the instrument in both a situational and dispositional capacity and ease of administration. When applying these four key criteria the Brief COPE has been identified as the most appropriate tool for this study. In addition to this the factors within the Brief COPE are easily segmented into emotion versus problem-focused coping strategies (although it is noted that this is not the intent of the authors the resultant factors are easily categorised) allowing for the testing of the hypothesis that project managers use more problem-focused coping strategies when attempting to deal with stressors at work, home and with their personal health. The Brief COPE also provides the flexibility to deviate from the simple two-part categorisation of coping strategies to allow for a more detailed exploration of coping strategy selection outside the bounds of the two (2) factor model. This flexibility is seen to be important given the lack of agreement amongst the stress and coping research community on the finality of the two (2) factor model, as discussed above in Section 3.3.

4 CONTROL

4.1 Theories of Control

Control is a complex and multi-faceted concept that interacts with and influences the coping process in a number of ways. In relation to the process-oriented coping framework proposed by Lazarus and Folkman the concept of control can be seen to exert its influence at the point of *primary appraisal.* Those who feel they have a greater degree of control over a given situation are a) more likely to appraise a situation as benign/positive or irrelevant and b) if the situation is appraised as stressful in the subsequent appraisal of threat/harm or challenge, challenge will be more likely as the threat/harm is mitigated by the sense of mastery and control.

> *"It is clear that beliefs about control, whether shaped more by person factors or situational contingencies, play a major role in determining the degree to which a person feels threatened or challenged in a stressful encounter."* (Lazarus and Folkman, 1984c,76)

Kobasa's (1985) research into the concept of hardiness supports this concept. She found high stress and low illness executives were more in control, more committed and more oriented to challenge than high stress/high illness executives.

Control also produces a significant impact on the *Secondary Appraisal* process when the question of "what can be done" is cognitively evaluated. Those with a greater sense of control are more likely to a) believe that there are adequate resources for dealing with the situation and b) select more problem-focused coping strategies and less emotion-focused coping strategies. The hypotheses being tested in this research are seeking to test this concept for applicability to project managers across multiple areas of life in which stressful events occur.

However mixed results have been found by researchers. O'Connor and Shimizu (2002) found in a cross cultural study of a sample of British and Japanese that problem-focused coping was positively correlated to control for the British sample but not for the Japanese sample leading them to conclude that the influence of control beyond a Western culture is not applicable. Troup and Dewe (2002) found that the

importance of control was positively correlated to the use of problem-focused coping and that overall control was negatively correlated to the use of emotion-focused coping. Overall their sample reported a greater use of problem- than emotion-focused coping strategies however the link between this result and the level of control experienced is unclear. Vitaliano et al (1990) had more definite results from their research into the Goodness of Fit Theory. Within the suicidal sample from their study, those who appraised their situations as more changeable reported higher levels of problem-focused coping strategies and lower levels of emotion focused coping than those who appraised the situation as unchangeable. Within the camp counsellor sample, those who appraised the situation as more changeable reported lower levels of emotion-focused coping. However the generalizability of these results is questionable due to the construct of the sample being three groups with psychological problems; suicidal, sex offenders and anger/dyscontrol and three groups with non-psychologically ill respondents; camp counsellor, spousal care givers and pelvic pain/tinnitus patients.

Lazarus and Folkman emphasise the need for researchers to distinguish between control as a cognitive or behavioural effort used to cope with a stressful encounter, and control as a belief that influences the cognitive appraisal process and subsequent coping strategy selection (Lazarus and Folkman, 1984b, 170). Control as a belief that influences the coping appraisal process is the concept that is being explored in the current research: specifically the impact of both perceived control at the primary appraisal stage of coping with the Transaction Theory of Coping and again at the secondary appraisal stage. This study explores the hypotheses that project managers have a higher level of perceived control leading to higher rates of challenge rather than threat assessments of stressful situation at work, home and with their personal health and that project managers will have a stronger belief that their actions will positively influence the outcome and be positively correlated to a more frequent selection and application of problem-focused coping strategies across all three (3) domains.

Control beliefs have been conceptualized in a number of ways throughout the literature. The two principal theories are Rotter's *Locus of Control* (1966) and

Bandura's *Self Efficacy* (1997a). The following sections detail these two theories and their relevance to this study.

4.1.1 Locus of Control

Rotter introduced the concept of internal versus external control of reinforcement in 1966. The concept was borne out of social learning theory (Rotter, 1975, 56) and is commonly referred to as locus of control. This concept has been the focus of much research into the nature of control, to the point that Rotter released a paper detailing problems and misconceptions about the construct and its application in research (Rotter, 1975). At the time of publication at least 600 studies had already been conducted. Its popularity in control research has not diminished over time.

The locus of control construct is based on the concept that individual perceptions of control are either centred more strongly with internal factors or external factors.

Lefcourt defines internal locus of control as

> *"the generalised expectancy of internal control, refers to the perception of events, whether positive or negative, as being a consequence of one's own actions and thereby potentially under personal control."* (Lefcourt, 1976)

And external locus of control as

> *"The generalised expectancy of external control, on the other hand, refers to the perception of positive or negative events as being unrelated to one's own behavior and thereby beyond personal control."* (Lefcourt, 1976)

The concept can be applied as both a situational variable and as a consistent characteristic of an individual (Rotter, 1975, 56). Of interest to this research are the individual beliefs surrounding control and its influence on the transactional process related to each stressful event. For this construct to be used to predict behaviour it must be assessed in relation to two key criteria, the value of the reinforcement to the individual and to the psychological situation – the context in which the reinforcement is occurring. Without the assessment or control of these variables the predictive power

of locus of control is considerably reduced. Further to this, locus of control can be measured as a generalised expectancy or a more specific expectancy to a particular situation or scenario. There are few key issues in relation to using a more generalised or specific expectancy assessment. Firstly, the relative importance of generalised expectancy increases as the situation is more novel or ambiguous and decreases as the individual's experience in that situation increases (Rotter, 1975, 57). Secondly, a very broad measure of generalised expectancy enables predictions of behaviour to be made in a greater number of varied situations, but at a low level. A more situation specific generalised expectancy allows for a better prediction for a situation of the same subclass but poorer prediction for other kinds of situations to some degree similar but not of the same subclass (Rotter, 1975, 59).

In the reporting of the findings from research there is a tendency for researchers to refer to individuals as “internals” or “externals” which can be misleading. Locus of control is not a stable attribute of a person that can be uncovered through research. Rather, it is a construct, which allows for an interpretation of comments made by people in response to questions about causality (Lefcourt, 1976). Lefcourt suggests that to safeguard against this aberration in language, locus of control should be viewed from the position that people do not possess the trait of locus of control, rather, they construct interpretations of events, so that it will be less disconcerting to encounter both stability and change in these constructions. Essentially locus of control is not necessarily stable and can change rapidly from question to question as well as over time (Lefcourt, 1976).

Rotter’s uni-dimensional view of locus of control has been challenged. Rotter found in his research the emergence of two possible groups within the *external* range. Essentially a small group of respondents who had scored highly on the external scale demonstrated behaviours of aggression and competitiveness that would ordinarily be found in respondents who scored higher on the internal scale. Rotter’s attempts to validate these subclasses based on “passive-externals” and “defensive-externals” failed (Rotter, 1975, 64). Hamsher, Geller and Rotter (1968) found that Interpersonal Trust, may enable the two external sub-scales to be divided into passive and defensive. Levenson (1973a, 1973b) attempted an alternative expansion of external locus of control into *chance* and *powerful others.* The rationale behind the subdivision

of external locus of control is founded in the influence of control. According to Levenson, those who believe that the world is unordered (controlled by chance) will behave differently to those who believe the world to be ordered and controlled by powerful others. With the latter situation Levenson proposes that there is the potential for control (Levenson, 1973a, 378). Factor analysis supports the distinction of powerful others and chance scales (P and C scales) however the results from Levenson's study of environmental activism are mixed as to the influence of the P and C scales on behaviour. Rotter has critiqued this dual scale as "these scales have a relatively high inter-correlation in most samples that she studies"(Rotter, 1975, 64). However, he goes on to say that *"it is possible that Levenson's distinction of belief in powerful others versus belief in chance overlaps that of defensive and passive externals"*. The Levenson Multi-dimensional Locus of Control Scale has nonetheless been used in a number of subsequent studies (Liang and Bogat, 1994, Petrosky and Birkimer, 1991).

Much of the coping research to date has utilised the Rotter I-E Scale (Anderson, 1977, Tanck and Robbins, 1979, Horner, 1996, Peacock and Wong, 1996) which measures locus of control as internally or externally focused, without the sub-categories within external locus of control. Anderson's (1977) longitudinal study of managerial locus of control, perceived stress, coping behaviours (task vs. emotion centred) and performance found that those who were more internally focused perceived less stress, employed more task-centred coping behaviours, and employed fewer emotion-centred coping behaviours than externals. Horner's (1996) research into the theory that locus of control and neuroticism predicts illness following the experience of stressors found similar results. Having an external locus of control was significantly related to high neuroticism, to less task-oriented coping and higher perceived stress.

For this current research the variability in the value of reinforcement, in this case the importance placed on the stressful event by the individual in relation to their overall world and the psychological context, in this case the nature of the stressful events reported, will not be controllable and may vary too greatly to allow for accurate measurement. Also, due to the cross situational assessment of coping strategies the measurement of perceived control will be a generalised measure and as Rotter details,

the capabilities of a generalised expectancy assessment would only provide a low predictive ability.

4.1.2 Self-Efficacy

The construct of self-efficacy is one of the key features of Bandura's Social Cognitive Theory (SCT) (1997a). Bandura defines perceived self-efficacy as referring

> *"to beliefs in one's capability to organize and execute the courses of action required to manage prospective situations. Efficacy beliefs influence how people think, feel, motivate themselves and act"* (Bandura, 1997a, 2)

Self-efficacy is developed and grown throughout the process of human development. According to Bandura (1997a), self-efficacy is developed through four main pathways, *mastery experiences*; successes build self-efficacy, *vicarious experience;* building self-efficacy through observing the success of comparable models, *social persuasion;* verbally re-enforcing self-efficacy, and *improving physiological and emotional states;* increasing self-efficacy by enhancing physical status, reducing stress and tendencies towards negative emotions, and correcting misinterpretations of bodily states.

Human behaviour is regulated through four efficacy activated processes, identified by Bandura (1997a) as, cognitive processes, motivational processes, affective processes and selection processes. The two that have the greatest influence in the coping process are cognitive and affective processes. According to Bandura most actions are based in thought which is also the foundation for the Transactional Theory of Coping proposed by Lazarus and Folkman (1984b) whereby coping responses (actions) are based on a cognitive appraisal process. Bandura goes on to say "Those who have a high sense of efficacy visualize success scenarios that provide positive guides and supports for performance. Those who doubt their efficacy visualize failure scenarios and dwell on the many things that can go wrong" (1997a, 6). The current research is exploring the hypothesis that project managers have a greater belief in the positive effect of their own actions in managing stressful situations and will therefore use more problem-focused coping strategies and less emotion-focused coping strategies in

dealing with stressful situations across multiple life domains. This hypothesis is suggested by Bandura's comments

> *"It requires a strong sense of efficacy to remain task oriented in the face of pressing situational demands, failures and setbacks that have significant personal and social repercussions. Indeed, when people are faced with the task of managing difficult environmental demands under taxing circumstances, those who harbor a low sense of efficacy become more and more erratic in their analytic thinking and lower their aspirations, and the quality of their performance deteriorates. In contrast, those who maintain a resilient sense of efficacy set themselves challenging goals and use good analytic thinking, which pays off in performance accomplishments."* (Bandura, 1997a, 6)

Schaubroeck and Merritt (1997) from their research into self-efficacy moderating whether job-control harms or helps coping with work stress found that those individuals with high self-efficacy benefited from increased job-control while those with low self-efficacy reported higher levels of stress. These results are supportive of Bandura's assertions from which it would be expected that those with lower self-efficacy, when given greater job-control and greater responsibility would not believe themselves capable of performing well, become more erratic in their analytic thinking, perform worse, reinforcing their low self-efficacy beliefs and in turn leading to increased stress.

Research by Endler et al. (2001) in their work with acute versus chronic health problem patients found a negative correlation between self-efficacy and emotion focused coping as well as finding that self-efficacy was a predictor of emotion focused coping, providing partial support for the hypothesis being tested as part of this research. However, they also reported that there was no correlation between self-efficacy and instrumental coping. This is contrary to the hypothesis of this research, that project managers will have a greater sense of control over the outcome of stressful situations which will be positively correlated to problem-focused coping as will the perceived situation specific sense of control being measured as part of the primary appraisal process.

Bandura (1977) also makes the distinction between efficacy expectancy; the belief that one has the ability to execute the required actions, and outcome expectancy; the belief that the chosen actions will lead to the required outcome. This distinction is posited at the key differentiator between the construct of self-efficacy and that of locus of control, two constructs that are often confused.

> *"Perceived self-efficacy and locus of control are sometimes mistakenly viewed as essentially the same phenomenon measured at different levels of generality. In point of fact, they represent entirely different phenomena. Beliefs about whether one can produce certain actions (perceived self-efficacy) cannot, by any stretch of the imagination, be considered the same as beliefs about whether actions affect outcomes (locus of control). The distinction is corroborated empirically (Bandura, 1991)"* (Bandura, 1997b, 20)

Bandura goes on to claim that as predictors of behaviour perceived self-efficacy is a "uniformly good predictor of diverse forms of behavior, whereas locus of control is generally a weak or inconsistent predictor of the same behaviors." (Bandura, 1997b, 20)

This distinction between perceived ability to apply actions and the outcomes of those actions has parallels with the distinction made by Lazarus and Folkman (1984a) in the Transactional Theory of Coping that the coping strategies selected and applied are not necessarily linked to outcomes. The efficacy expectancy forms the basis for the influence of control beliefs on secondary appraisal (Lazarus and Folkman, 1984c, 70). This identified relationship is a key driver for the selection of Self Efficacy as the manifestation of control that it explored in this research. It addresses the research question "What role does control have in the coping process for project managers?"

a. Situation Specific Self-Efficacy

Bandura conceptualized self-efficacy as a situation- or domain-specific construct. He posited that a high sense of self efficacy in one domain would not necessarily indicate a high sense of self-efficacy in another (Bandura, 1997b). Within the context of

coping with stressful situations there are two forms of efficacy that influence the affective processes, specifically, *coping efficacy* and *thought control efficacy* (Bandura, 1997a). Coping efficacy refers to the belief by an individual that they have the required resources as well as the ability to deploy those resources successfully in dealing with stressful situations. Thought control efficacy is the belief by an individual that they can control any disturbing thoughts that they may have about a stressful situation which themselves would compound anxiety and depression. Together these forms of self-efficacy mediate the effects of stressful situations on anxiety, depression and motivation. Bandura's description of the effects of such efficacy beliefs covers the cognitive processes described by Lazarus and Folkman (1984b) at both the primary and secondary appraisal junctures and is supported by Moos and Schaefer (1993).

> *"Efficacy beliefs affect vigilance toward potential threats and how they are perceived and cognitively processed. People who believe that potential threats are unmanageable view many aspects of their environment as fraught with danger. They will dwell on their coping deficiencies.....In contrast, people who believe they can exercise control over potential threats are neither ever watchful for threats or conjure up disturbing thoughts about them."* (Bandura, 1997a, 8)

Within the context of this research domain specific coping self-efficacy is explored through the primary appraisal of stressful situations. This will address the research question "*How do project managers appraise stressful situations?"*

b. General Self-Efficacy

Although Bandura primarily conceptualised self-efficacy as a situation specific construct with limited or no linkages between domains there are a number of researchers in recent times who have explored the concept of a cumulative effect of self-efficacy (Sherer et al., 1982, Shelton, 1990, Woodruff and Cashman, 1993, Schwarzer and Scholz, 2000, Wood et al., 2000, Luszczynska et al., 2005c). This concept of a generalised form of self-efficacy is defined by Luszczynska, Scholz and Schwarzer as

> *"the belief in one's competence to cope with a broad range of stressful or challenging demands, whereas specific self-efficacy is constrained to a particular task at hand."(Luszczynska et al., 2005c)*

The study of General Self-Efficacy (GSE) across multiple cultures conducted by Luszczynska, Scholz and Schwarzer (2005c) sought to validate the construct by investigating relationships between GSE and Social Cognitive Theory (SCT) constructs. In particular, the study sought to investigate GSE's relationship with domain specific optimistic self-beliefs such as physical activity self efficacy, nutrition self efficacy and smoking self-efficacy. As well as GSE and Affect, quality of life, perceived intensity of pain and performance of healthy behaviours were also explored. Finally, the study sought to investigate the relationship between GSE and coping strategies, in particular, the researchers were seeking to find a positive correlation with the use of active, problem-focused coping strategies and a negative correlation to the use of passive coping strategies. The results of this study found that "General self-efficacy appears to be a universal construct that yields meaningful relations with other psychological constructs" (Luszczynska et al., 2005c, 439).

GSE and its relationship with coping strategy selection and application is explored by Luszczynska et al (2005b) using a similar hypothesis to that being used within this research; namely *that higher GSE would be related to more frequent use of active and problem-focused coping strategies and less use of passive coping strategies*. Their study used a combination of the Brief COPE (Carver, 1997) and two items developed by Brown and Nicassio (1987) to assess active and passive coping with pain. It is unclear from the research whether these were used in their dispositional or situational formats however the results indicate that among the gastrointestinal disease sample GSE was related to less frequent use of passive coping and a greater reliance on active coping with pain. In the sample of cancer patients GSE was positively related to use of active coping, planning, positive reframing, humour, fighting spirit and seeking information. GSE was negatively correlated with use of self-blame and behavioural disengagement in cancer patients. These results provide indicative support for the hypotheses being used in this research however this support should be taken cautiously. The sample for the Luszczynska et al (2005b) study consisted of a motley group of cancer patients, heart disease patients, gastrointestinal patients, students,

athletes and individuals. Although positive correlations were found supporting the hypothesis they were restricted to the cancer and gastrointestinal patient groups. Furthermore the sample used is not representative of the sample being used in this research being that of project managers.

Although GSE is a relatively new conceptualisation of self-efficacy there has been substantial research conducted into its applicability and its ability to predict situation specific efficacy. The results indicate that it is a viable interpretation and application of the construct (Sherer and Adams, 1983, Shelton, 1990, Jerusalem and Schwarzer, 1992, Woodruff and Cashman, 1993, Schwarzer and Scholz, 2000, Chen et al., 2001, Perrewé et al., 2002, Luszczynska et al., 2005c, DeRue and Morgeson, 2007, Zumberg et al., 2008, Wu, 2009, Matsuo et al., 2010); In Shelton's analysis of the development of the construct of GSE (1990) she identifies GSE as follows:

> *"General self-efficacy determines an individual's general confidence or success-ability, which significantly influences self-efficacy expectations for a specific situation. In other words, it is this general state of self-efficacy derived from an integration of all significant successes and failures, that contributes to an individual's basic efficacy expectancies toward a given task. This provides an explanation for why two people, each facing something feared or challenging, display different efficacy expectancies of initiation and persistence of behavior."* (Shelton, 1990, 922)

Shelton also explores the relationship between GSE and Situation Specific Self Efficacy showing "how the behavioral components of specific self-efficacy reinforce and contribute to both specific and general self-efficacy and how general and specific self-efficacy consequently influence behavior" (Shelton, 1990, 990). The relationship between the two efficacy constructs is represented as intertwined and reciprocally influential.

Woodruff and Cashman (1993) have put forth an argument for a multi-level self-efficacy construct that includes situation specific, domain specific and general self efficacy. Rather than general self-efficacy being based on experiences from a variety

of situations, as described by Sherer (1982, 1983), posit an alternative concept of domain efficacy:*"An alternative to this complete compilation process would be the selective interpretation of similar experiences. By this we mean that in new situations an individual's expectancies would be based on experiences in the most similar type of situation"* (Woodruff and Cashman, 1993, 423). Woodruff and Cashman criticise Shelton for her interpretation of task-specific efficacy and it generalisability in her assessment instrument construction and they have criticism of Sherer et al's (1982) development of the Self Efficacy Scale as being domain specific. However their research has no clear results supporting their criticism or their model of domain efficacy. Rather, their use of Sherer et al's Self Efficacy Scale proved it to be "more intricate than originally reported" (Woodruff and Cashman, 1993, 423) and a good measure of academic self-efficacy. Being a good measure in a specific domain does not provide evidence that it is an ineffective general self-efficacy assessment tool. Their analysis of the relationship between the GSE results and a range of personality components showed appropriate relationships and their analysis established the criterion validity of the scale.

Recently a study was conducted across 8796 participants from Costa Rica, Germany, Poland, Turkey, and the USA (Luszczynska et al., 2005a) to explore whether perceived self-efficacy is a universal psychological construct. The results of this study show that "perceived general self-efficacy appears to be a universal construct that yields meaningful relations with other psychological constructs" (Luszczynska et al., 2005a, 80).

4.1.3 Multi-faceted Nature of Perceived Control

Troup and Dewe's (2002) research into the appraisal of situational control for work-related situations used a unique model for conceptualizing control as a multi-faceted construct focusing on both the level of perceived control and the importance of control. This model attempts to capture the complex nature of control and its influence on the cognitive appraisal process for stressful situations as well as tackling the question posed by Lazarus and Folkman about "what exactly is being controlled in situational control research?" Along with the perceived and importance ratings, control is divided into four key areas, *task control, predictability, self-control* and *general control*. Their research into control and coping behaviours of 134 New

Zealand public service workers found that, having task control contributed less to a feeling of control than either self-control or predictability. When reporting on how much control they actually had respondents rated self-control higher than all other forms of control however candidates reported less perceived control over events than they reported was important for them to have. Early work by Folkman et al (1986) gave a preliminary insight into the importance of self-control in the process-oriented approach to coping. In their longitudinal study of 75 white families, self-control (which they labelled an emotion-focused form of coping) emerged in all three studies. This was one of several unique factors that had not emerged in any of their previous research.

In relation to coping behaviours in general the Troup and Dewe sample reported using more problem-focused coping strategies than emotion-focused strategies which is consistent with the research by Folkman et al (1986) whereby problem-focused coping strategies tend to be used more frequently in dealing with work-based stressors.

4.1.4 Summary

The concept of control and its affect on the cognitive process of coping, outlined in the Transactional Theory of Coping, is crucial to this research. The assessment of actual control is achievable to some degree in a laboratory setting but due to the self-assessment design of this research actual control is not being assessed. Rather perceived control determined by each individual within specific stressful events will be measured. Perceived control being a cognitive function fits well within the Transaction Theory of Coping, which is itself a model of the cognitive process of coping. Perceived control operates at both the primary and secondary appraisal junctions influencing the decision of challenge or threat for stressful events and the actual selection of coping strategies. Primary appraisal will be evaluated in this research using two items measuring the degree of perceived changeability of the stressful event and the challenge versus threat appraisal, both measured on a Likert scale. The theories of control discussed in this section are specifically related to the conceptualisation of control in the secondary appraisal process. For the purposes of this research control is conceptualised using the General Self Efficacy (GSE) model. Of the two most commonly used control constructs the GSE most closely aligns with

the secondary appraisal process found in the Transactional Theory of Coping and as such is a good fit for this research. The GSE will be used to explore the hypotheses that project managers have a greater belief in their own ability to influence the outcome of stressful situation and that this higher sense of control will be positively related to a greater use of problem-focused coping strategies.

4.2 Adaptation Outcomes from Coping Strategy Application

Although it is not the intention of this research to explore the outcomes of coping strategy adoption it is important to consider the potential adaptive or maladaptive outcomes as it underpins the contribution to knowledge this thesis provides. As discussed in the section 1.1 above the cost of stress to industry is significant not only in monetary terms but also from a human capital perspective. The burn out of productive humans has a social cost that goes beyond that which can be measured in monetary terms. As projects provide a constant source of stress with potential (hypothesized in this thesis) impact on how project managers cope with stress beyond the bounds of work, understanding these patterns and the likely adaptive or maladaptive nature is critical to being able to maintain a healthy level of stress in a project manager population. The following section outlines the two (2) most prevalent adaptation theories for coping responses.

4.2.1 Goodness of Fit Theory

The *Goodness of Fit Theory* (Folkman et al., 1986, Folkman and Moskowitz, 2004) is a two part theory. The first part is based on the theory that cognitive appraisal is a determinant of coping strategy selection and secondly that the appropriate selection of coping strategies will lead to more adaptive outcomes. This can be summarised as problem focused coping will be selected more often and be more adaptive in controllable situations and emotion focused coping will be selected more often and be more adaptive in uncontrollable situations.

The goodness of fit between appraisal, coping responses and a stressful situation has been explored by a number of other researchers (Vitaliano et al., 1990, Terry and Hynes, 1998, Endler et al., 2000, Patterson, 2003) with varying and contradictory results (Folkman and Moskowitz, 2004, 755). The focus of this research has been to take the assessment of coping one step beyond the bounds of the transactional theory

of coping and into the realm of effectiveness of the coping response used. Vitaliano defines this focus as

> *"The goodness of fit between appraisal and coping in response to a specific stressor is intrinsic to the cognitive-phenomenological model of stress. The term goodness of fit refers to the appropriateness of a coping response, given a particular appraisal, and to the affective consequences of a match between appraisal and coping."* (Vitaliano et al., 1990 ,582)

Vitaliano et al examined the goodness of fit between the appraisal of a stressor (as changeable or not changeable), coping and distress across six samples. These samples included three with psychological problems (suicidal, sex offenders and anger/dyscontrol) and three non-psychologically ill groups (pelvic pain/tinnitus patients, camp counsellors and spouse caregivers). The Ways of Coping Questionnaire (revised) was used to assess coping strategies and adaptation was assessed by measuring depression using the Symptoms Checklist, Depression Scale and the Brief Beck Depression Inventory. They found that for the samples with non-psychiatric conditions, problem-focused coping and depressed mood were negatively related when a stressor was appraised as changeable but were unrelated when a stressor was appraised as not changeable. Emotion-focused coping was positively related to depression when a stressor was appraised as changeable. No general relations were observed in the people with psychiatric conditions. These results show partial support for the Goodness of Fit Theory however the support is relatively low. Vitaliano et al also go on to say that without considering appraisal, coping and distress together, i.e. when coping across appraisal groups was analysed without considering the relationship with depression, there was no goodness of fit observed.

Folkman and Lazarus administered the Ways of Coping Questionnaire to a group of middle aged community residents (1980) in their study analysing the ways 100 community-residing men and women aged 45-64 coped with the stressful events of daily living over the course of a year. The construct of control in this study was measured using a simple four item categorisation of appraisal for each of the stressful events reported. These four items were as follows:

1. That you could change or do something about
2. That it must be accepted or gotten used to
3. That you needed to know more about before you could act
4. That you had to hold yourself back from doing what you wanted to do

Folkman and Lazarus found support for the theory that control appraisals were determinants of coping strategies. They found that situations appraised as "something constructive could be done" generated higher levels of problem-focused coping whereas situations that had to be accepted or where the person had to hold back generated higher levels of emotion-focused coping. No adaptation elements were measured in this study so the outcomes of the strategy selection could not be analysed.

In Folkman and Moskowitz (2004) review of the coping literature to date they emphasise the number of conflicting results surrounding studies into the Goodness of Fit Theory. They comment on a number of findings including that the Christensen et al. (1995) study of haemodialysis patients and adherence found that coping involving planful problem solving was associated with more favourable adherence when the stressor involved a relatively controllable aspect of the haemodialysis context. For stressors that were less controllable, emotional self-control, a form of emotion-focused coping, was associated with more favourable adherence.

Terry and Hynes (1998) conducted their study looking at the effects of coping responses to a low-control situation, specifically failed IVF treatment. Terry and Hynes suggest that the variation in results from studies in the Goodness of Fit Theory arise due to a lack of detail within the problem and emotion-focused coping assessment. They proposed that by splitting each in two to form problem-management coping, problem-appraisal coping, emotion-approach coping, emotion-avoidance-coping then greater support for the theory would be found. The results of their study demonstrated that reliance on escapism was associated with poor adjustment. Emotional approach coping was associated with better adjustment and that problem appraisal coping was linked to better adjustment. There was also some evidence of problem management coping being associated with poor adjustment. These results show moderate support for the Goodness of Fit Theory however this study assumes that all subjects have appraised the situation as low-control. Although the assumption

may be reasonable it was not assessed and control appraisals by individuals can often be seemingly illogical. It would appear dangerous to assume a control appraisal across an entire sample. However assuming that all subjects do appraise the failed IVF treatment as low-control this study only looks at one side of the equation. To be fully supportive of the Goodness of Fit Theory a further study into a high control situation would have to be conducted.

4.2.2 Hardiness

The concept of hardiness was introduced by Kobasa (1985) in her ground breaking research into why highly stressed subjects who remain healthy differ from those who get ill along with high stress. The concept of hardiness itself is not a theory of control, however it is a significant contributor to the stress and coping landscape that has impacts on both control and outcomes and as such is discussed briefly in this section. This research does not seek to test or apply the concept of hardiness due mainly to the fact that it requires research into the outcome of coping strategy selection and application which is outside the scope of this work. Kobasa defines a hardy individual as possessing three general characteristics

1. the belief that they can control or influence the events of their experience
2. an ability to feel deeply involved in or committed to the activities of their lives
3. the anticipation of change as an exciting challenge to further development

Kobasa used a sample of male executives to test the theory that people with a greater sense of control over what occurs in their lives will remain healthier when under stress than those that feel powerless in the face of external events. She found that staying healthy under stress is highly dependent on having a strong sense of commitment to self. She also found that the hardy executive will

> *"approach the necessary readjustments in his life with*
> *(a) a clear sense of his values, goals, and capabilities, and a belief in their importance (commitment to rather than alienation from self) and*
> *(b) a strong tendency toward active involvement with his environment (vigorous rather than vegetativeness)."* (Kobasa, 1985, 185)

Kobasa included an assessment of locus of control in her study and found that an internal locus of control allows the hardy executive to approach the transfer [element of change used in the study] with the recognition that although the change may have been initiated externally the actual course the event will take is dependent upon how he manages it. Kobasa also found that the executive who is low in hardiness will "react to the transfer with less sense of personal resource, more acquiescence, more encroachments of meaninglessness, and a conviction that the change has been externally determined with no possibility of control on his part." (Kobasa, 1985, 187)

4.2.3 Summary

This research will be examining the first concept within the Goodness of Fit Theory. The hypotheses surrounding the interaction of control appraisals and coping strategy selection across a varied array of stressful situations is expected to reveal that project managers have a high propensity to appraise situations as controllable and select more problem-focused coping strategies as a result. However this research will not be examining the adaptive results of the choice of coping strategy in each situation. Similarly the concept of Hardiness is focused entirely on the adaptation by individuals to coping strategy selection and as such is outside the bounds of this research.

4.3 Self Efficacy Measurement Instruments

4.3.1 Specific Self Efficacy Assessment Instruments

The measurement of control, as with coping strategy selection, has been primarily conducted through the use of self-assessment questionnaires. In the assessment of situation specific self efficacy Bandura provides guidance for instrument design (1997b). Bandura describes the standard methodology for measuring efficacy beliefs as being where subjects are shown items that related to different levels of task demand. They are then asked to rate their ability to complete each task. In Bandura's research with snake phobics (1980) they were presented with 29 performance tasks requiring increasingly threatening contact with a snake. Bandura recommends that each item be phrased with the words *"can do"* rather than *"will do"* because *can* is a judgement of capability rather than a statement of intention which *will* is. Subjects are then asked to rate on a 100 point scale their level of belief that they can complete each task. Subjects should be instructed to rate their overall capabilities as of now, not past or future expected capabilities. Bandura has used this assessment format in numerous

studies including the exploration of catecholamine secretion as a function of perceived coping self-efficacy and his work with snake phobics (1980, 1985).

Pajares, Hartley and Valiante conducted research to investigate whether the 0-100 format, proposed by Bandura, of assessing writing self-efficacy beliefs differed in empirical qualities from the traditional 0-6 point Likert-type formal. They conducted their research using a sample of 497 middle school students and found that "Bandura's (1997) guidelines regarding self-efficacy assessment are empirically well-grounded. Results of the factor and reliability analyses showed that a writing self-efficacy scale with a 0-100 response format was psychometrically stronger than a traditional Likert format scale." (Pajares et al., 2001, 219)

Other researchers have used a mix of self-developed self-efficacy assessment tools (Ozer and Bandura, 1990, Sklar and Turner, 1999, Wiedenfeld et al., 1990, Chemers et al., 2001) and substitute measures such as Endler, Kocovski, and Macrodimitris' (2001) use of the Personal Attitudes Scale, 17 item measure when exploring the perceived control of those with acute vs. chronic health problems.

The guidelines given above are excellent for those researchers who are a) exploring situation specific self-efficacy as conceptualised by Bandura in his Social Cognitive Theory and b) are working in a domain that requires new self-efficacy assessment instruments to be created. However, this research is seeking to a) explore the effect of a generalised sense of self-efficacy and b) utilise only those assessment instruments that have been developed and proven in a range of situations to improve the reliability and validity of the results obtained. Generalised Self-Efficacy by its very nature is more likely to have existing measurement instruments that are applicable across the varied stressful situations being explored in this research, namely the domains of, work, home and personal health. However, due to the relative newness of the construct and subsequent research there are a limited number of proven assessment tools. The two most widely used tools are the Self Efficacy Scale by Sherer et al (1982) and the General Self Efficacy Scale by Schwarzer and Jerusalem (1992).

4.3.2 Generalised Self Efficacy Assessment Instruments

a. The Self Efficacy Scale

Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs, and Rogers (1982) attempt to develop a measure of self-efficacy that was not tied to specific situations or behaviour resulted in the Self-Efficacy Scale. The original version consisted of 36 items and focused on 3 areas (a) willingness to initiate behaviour, (b) willingness to expend effort (c) persistence. They tested the instrument on 376 students who completed the Self-Efficacy Scale and a range of six (6) additional personality measures. The personality assessments included Rotter's Internal-External Control Scale, Personal Control Subscale of the I-E Scale, the Marlowe-Crowne Social Desirability Scale, the Ego Strength Scale, Interpersonal Competency Scale and the Self-esteem scale.

Factor analysis resulted in a 2-factor solution with 17-items loading to Factor 1, General Self-Efficacy Subscale and, 6-items loading to Factor 2, the Social Self-Efficacy Subscale. Cronbach Alphas were .86 and .71 respectively.

Modifications were made resulting in a reduced 23-item scale based on the 2-factor model and the study was replicated with 298 students. All predicted correlations with the personality factors were obtained and none were large enough to indicate that the scales were measuring the same underlying concept.

A further study was conducted with 150 inpatients from the Tuscaloosa Veterans Admin Medical Centre to assess the criterion validity of the scale. Each subject completed the Self-Efficacy Scale and a Demographic Questionnaire. This study found that subjects with high Self Efficacy scores were more likely to be employed, have quit fewer jobs, to have been fired less. General Self Efficacy scores correlated positively with educational levels and military rank and General Self Efficacy scores predicted past success in vocational, educational and military goals.

Sherer and Adams (1983) conducted a further validation study which investigated the relationships between the Self-efficacy subscales and other personality measures, namely the MMPI, Rathus Assertiveness Schedule, and Ben Sex-role Inventory. The

results supported the validity of the Self-Efficacy Scale as a measure of generalised self-efficacy.

The Self-Efficacy Scale has been used by a number of researchers including Ferrari and Parker's exploration of self-efficacy as a predictor of high school achievement (1992) and Woodruff and Cashman's examination of the relationship between general and task-specific efficacy (1993). The full assessment instrument is provided in Appendix B.

b. New General Self-Efficacy Scale

The Self-Efficacy Scale discussed above showed moderate to high internal consistency however Chen and Gully, as reported by Chen et al. (2001), reported low test-retest results. In addition to the weak retest results Chen et al discussed additional issues with potential multi-dimensionality of the Self-Efficacy Scale. They state that "there is a serious discrepancy between the conceptualization of GSE as an undifferentiated belief in one's generalized ability as a unitary construct on one hand and the multi-factorial structure of the SGSE [Self-Efficacy Scale] scale" (Chen et al., 2001, 66). Chen et al created a New General Self-Efficacy Scale (NGSE). The NGSE contained seven (7) of the Self-Efficacy Scales and an additional seven (7) scales created by the researchers. The instrument was tested on 317 students. The scale uses a 5-point Likert scale from (1) strongly disagree, to (5) strongly agree. The instrument was applied three (3) times with an average of 22 days between assessments. The aim of this first study was to examine the reliability and dimensionality of the NGSE scale. The NGSE was reduced to an eight (8) item instrument and a second study was conducted. The second study was designed to test whether the NGSE scale and the SGSE scale are distinct from self-esteem. And finally they conducted a third study to test the cross language and cultural robustness of the NGSE by testing it in Hebrew with a group of Israeli managers. Their results found that the NGSE had strong internal consistency results and measures a single dimension and in their opinion is "is a more valid measure of GSE than is the SGSE scale" (Chen et al., 2001, 77). The full assessment instrument is provided in Appendix B.

c. General Self-Efficacy Scale

The German version of the General Self-Efficacy Scale was created by Jerusalem and Schwartzer in 1979. It is currently available in twenty-seven (27) languages (Schwartzer, 2009a) translated and validated by a range of bi-lingual researchers. The General Self-Efficacy scale was originally presented as a 20-item instrument but has subsequently been reduced to a 10-item instrument that uses a 4-point scale 1 = Not at all true 2 = Hardly true 3 = Moderately true 4 = Exactly true, the full scale is provided in the Appendix below (Schwarzer and Jerusalem, 1995). The scale has been tested and validated in numerous studies (Zhang and Schwarzer, 1995, Bäßler and Schwarzer, 1996, Schwarzer et al., 1996, Schwarzer et al., 1997, Schwarzer et al., 1999, Rimm and Jerusalem, 1999, Luszczynska et al., 2005a, Luszczynska et al., 2005c) showing strong internal consistency

> *"The scale has been used in numerous research projects, where it has typically yielded internal consistencies between alpha = .75 and .91. Its stability has been examined in several longitudinal studies."* (Schwarzer and Scholz, 2000, 2)

As well as consistent results across cultures;

> *"The psychometric properties of the self-efficacy scale turned out to be very satisfactory and in line with previous research. The construct seems to be a universal one since very similar characteristics have been found in many cultures."* (Schwarzer and Scholz, 2000, 4)

The GSE has been used in several studies as part of the investigation of stress and coping. Luszcynska, Schloz and Schwartzer (2005c) in their study of cancer patients, heart disease patients, students, athletes and random individuals used the GSE scale in combination with the Brief COPE to explore the relationship between generalised self efficacy and the domain specific optimistic self-beliefs and their coping strategy selection. Their finding that GSE was related to adaptive, problem-focused coping with stress (Luszczynska et al., 2005c, 454) provides support for the hypotheses being explored in this study for project managers with stronger beliefs in their own ability to

effect positive outcomes from stressful encounters to select and apply more problem-focused coping strategies.

The GSE scale was also used by Jerusalem and Schwartzer in their study of 210 adults investigating the relationship between general self-efficacy and stress appraisals in a laboratory setting. Their finding that highly self-efficacy played a significant role in the buffering the experience of stress "whereas low self-efficacy puts individuals at risk for a dramatic increase in threat and loss appraisals." (Jerusalem and Schwarzer, 1992, 195)

4.3.3 Summary

The analysis of the available approaches to self-efficacy assessment provided two (2) clear options. The first of these is the assessment of situation specific efficacy and the second is a more generalised assessment. In relation to the hypotheses being tested in this research and the research design which explores the coping patterns of project managers across multiple life domains and an indeterminate number of potential stressful events it was not deemed possible to accurately pre-define the specificity of the stressors required to create or use a situation specific efficacy tool. As such the concept and associated tools for a general self-efficacy assessment have been selected for use in this study. Similar to choosing the appropriate coping strategy assessment instrument a number of determining factors were applied including: consistent factor analysis results across a range of sample populations, high internal consistency coefficients, the availability of data from other studies for comparison against the project manager specific sample collected plus ease of administration. When applying these four key criteria the Generalised Self Efficacy assessment tool has been identified as the most appropriate tool for this study. The GSE has an available database of over 18000 respondents from studies conducted around the world which will act as a substitute control sample for this portion of the research (Schwartzer, 2009b).

5 METHODOLOGY

5.1 Research Questions

The purpose of this study is to investigate the relationship between the culture of project management and the selection of coping strategies project managers make when managing stressful situations.

The study is based on the concept that the planning and problem solving foundations of project management form a culture of project management to which project managers become acculturated and which in turn influences their selection of coping strategies towards that of planful problem solving at work and in their personal lives. This concept has been integrated into the Transactional Theory of Coping to produce a model of coping, shown in Figure 9 below that looks to explore how project management culture influences directly and indirectly the final coping strategy selection across the three (3) domains of work (W), home (H) and personal health (PH) stressors. The research questions and hypotheses for this study are derived from this model.

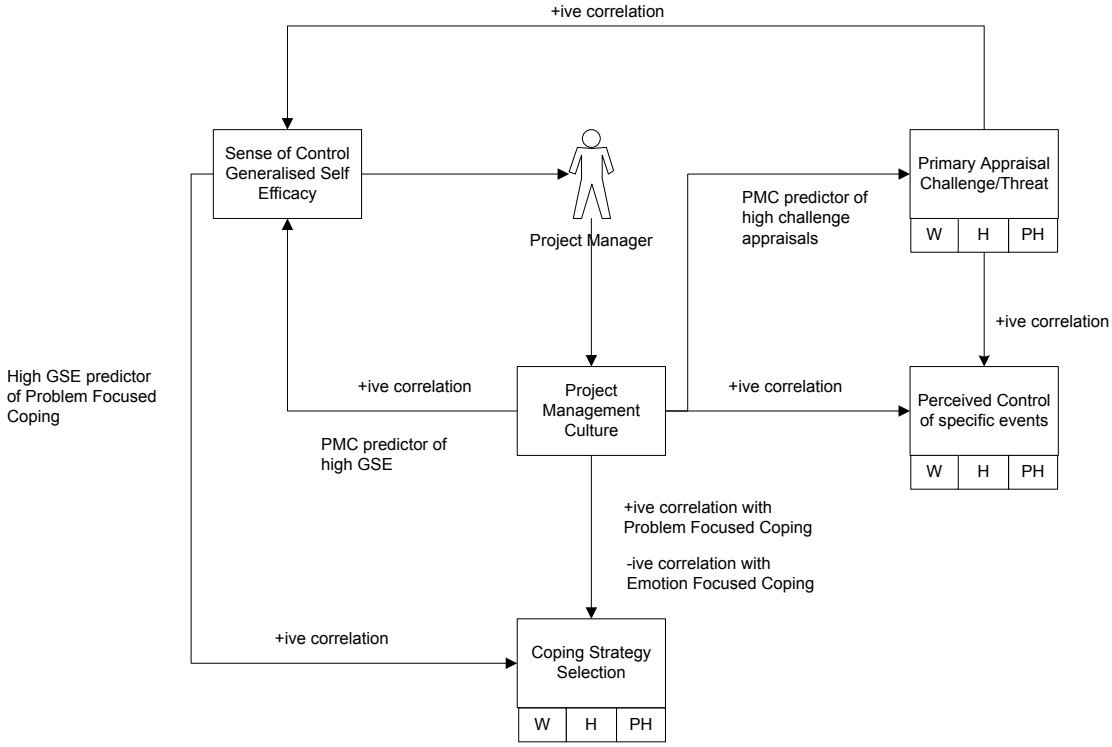

Figure 9 - Model of Project Management Culture's Effect on the Coping Process

The research questions are as follows

1. What are the dispositional coping strategies used by Project Managers in stressful situations?
2. What are the coping strategies used by Project Managers in specific stressful situations?
3. What role does perceived control have in the primary appraisal component of the coping process for project managers?
4. What role does perceived control have in the secondary appraisal component of the coping process for project managers?
5. What is the overall affect of control on coping strategy selection?
6. What relationship does project management culture have with the coping strategy selection for project managers?

There are a number of hypotheses associated with each research question. They are as follows:

What are the dispositional coping strategies used by Project Managers in stressful situations?

H01: That project managers use more problem-focused coping strategies, specifically active coping and planning, than emotion-focused strategies when dealing with stressful situations in general.

What are the coping strategies used by Project Managers in specific stressful situations?

H02: That project managers use more problem-focused coping strategies than emotion-focused strategies when coping with specific stressful situations across all three (3) domains, work, home and personal health.

What role does perceived control have in the primary appraisal component of the coping process for project managers?

H03: That project managers appraise stressful situations as “challenges” rather than “threats” across all three (3) domains, work, home and personal health.

H04: That project managers appraise stressful situations across all three (3) domains, work, home and personal health as "amenable to change" more often than uncontrollable.

H05: That appraisals of stressful situations as "amenable to change" will be positively correlated with "challenge" appraisals across all three (3) domains, work, home and personal health.

What role does perceived control have in the secondary appraisal component of the coping process for project managers?

H06: That project managers will have a stronger belief in their own actions resulting in positive outcomes in relation to managing stressful events, characterised by their level of General Self-Efficacy (GSE) than general populations.

H07: That GSE will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.

H08: That GSE will be a predictor of active coping and planning across all three (3) domains, work, home and personal health.

What is the overall effect of control on coping strategy selection?

H09: That perceived control appraisals, challenge/threat appraisals and GSE will be predictors of coping strategy selection. Specifically, higher levels of perceived control, challenge appraisals and higher GSE scores will predict the use of problem focused coping strategies across all three (3) domains, work, home and personal health.

What role does project management culture have in coping process for project managers?

H010: That project management culture will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.

H11: That project management culture will be negatively correlated with the use of emotion-focused coping strategies in dealing with stressful situations across all three (3) domains, work, home and personal health.

H12: That project management culture will be a predictor of the use of active coping and planning as the dominant coping strategies used in dealing with stressful situations across all three (3) domains, work, home and personal health.

H13: That project management culture will be a predictor of "challenge" and "amenable to change" appraisals of stressful situations across all three (3) domains, work, home and personal health.

H14: That project management culture will be positively correlated with GSE.

5.2 Research Design

To address the research questions and test the hypotheses the research design for the this study involves gathering of data on three components

1. Project Management Culture represented by:
    a. Project Environment (including project management maturity)
    b. Individual Project Management Competence
2. Coping Strategy Selection
3. General Self-Efficacy

The assessment of project management culture is predominantly based on the GAPPS standard. As the literature review has demonstrated the use of performance based standards is an effective and proven method of assessing individual project manager competence. The GAPPS standard has been selected as it provides a set of assessment criteria that are relevant to current project management practice. The CIFTER component of the standard provides a basis for assessment of project environment, in terms of management complexity. The CIFTER provides a structured approach to the assessment of the factors affecting project management complexity than has been possible in previous research. Individual project management competence, assessed and expressed against performance based standards is a good indicator of project

management acculturation. The maturity of use and acceptance of project management approach and practices is a good indicator of the strength of the project management culture in the work environment. However, the literature review identified a number of structural issues with the use of complete project management maturity models. Therefore, in this study the project maturity assessment measure is a single item measuring the perceived level of project management maturity of the organisations in which the subjects are working. This has been used successfully in similar studies (Crawford, 2000b)

The coping strategy selection assessment, the Brief COPE (Carver, 1997), as discussed in section 3.5.3, is used three (3) times with each subject to capture comparative data for each subject on coping strategy selection in three (3) different stressful situations – work (W), home (H) and personal health (PH). The data captured allows for an investigation into possible positive correlation between the scenarios.

The general self-efficacy measure, the General Self-Efficacy Scale (Schwartzer, 2009a), as discussed in section 4.3.2c, provides a single efficacy score which allows for correlations between coping strategy selection and appraisal and generalised self-efficacy to be investigated. The general self-efficacy measure can also be used in the regression analysis to determine whether general self-efficacy is a predictor of control appraisals and use of planning and active coping strategies.

The research design is based on a positivist approach to research. Data capture is conducted through questionnaires and the sample size is designed to be large enough to conduct statistical analysis and to ensure that the findings are as generalisable as possible. The aim of the research is to provide a basis for prediction of coping strategy selection as well as description of the observable phenomenon. Exploratory and confirmatory analysis has been conducted to identify the extent to which the results support the hypotheses determined from the literature review.

The data captured is in four (4) parts; first data has been captured based on the GAPPS standard of what project managers do when managing projects. Secondly data has been captured about the environment in which the project managers are applying their skills. This includes the factors that add to the complexity of the work they are

conducting and the maturity of the organisational project management practices around them. Thirdly data has been captured on the coping strategies selected and applied by project managers in the management of three (3) distinct stressful situations, at work, at home and in personal health. Finally data has been captured on the level of generalised self-efficacy of each subject. The quantitative approach to data capture is recognised as lacking depth of understanding of each individual subject's particular project environment however the benefits of providing widely generalisable findings as a basis for further qualitative research was decided be of greater value for this study

The following section details the individual components of the research design including the strategy for data collection, the instruments used, the processes and issues surrounding ethical treatment of subjects and the approach to the data analysis.

5.3 Data Collection Strategy

5.3.1 Data Collection Process

The research design requires a relatively large questionnaire to be completed and lack of time is a recognized issue for the proposed sample. This, in conjunction with the difficulties associated with getting respondents to complete questionnaires required measures to be taken to reduce the time impact and ensure the data collection process was as efficient as possible. The questionnaire was web-enabled and only forward motion was allowed through the questions. This enabled candidates to complete the questionnaire in one or multiple sittings allowing participation in the study to fit in with existing busy schedules. The forward motion restriction ensures that candidates cannot retrace steps and continually alter their responses. This feature had two (2) benefits, firstly it reduces the time subjects are able to spend on the questionnaire and secondly it reduces the risk that subjects who complete the questionnaire in multiple parts do not have their submitted responses altered by discussion with other participants. Web-enabling the questionnaire also allows for a global distribution increasing the potential sample size.

The large sample size required by the research design, two hundred (200) or more subjects, was recognized to be a significant challenge within the research. It was decided that the most suitable approach was to engage organisations with project

managers to allow their personnel to participate in the study in return for an organisational benefit rather than attempt to identify and approach individual project managers. This approach was thought to provide a higher response rate and allow the researcher to ensure that the subjects participating in the study were all fulfilling the role of project manager rather than simply holding the title or self evaluating their role as that of a project manager. Preparation began early in the study to locate potential organisational partners who would provide five (5) to twenty (40) participants. The maximum sample size was included to ensure that the sample was not dominated by any single organisation. Organisations operating in different countries were allowed multiple entries into the study as they were considered to have enough cultural and geographical differences to create distinct cultures. The research design requires approximately fifteen (15) to sixty (60) organisations willing to participate. Organisations were sought through a variety of means including, a. personal networks, b. academic institutions running masters programs in project management and c. advertising in general publications and websites for organisations interested in participating. The decision to include advertising to the general community was included in the data collection strategy to increase the range of potential organisations beyond the immediate network of the researcher. This strategy had two (2) key benefits, firstly it increased the sample size and secondly by the inclusion of organisations with no link to the researcher, any bias in the sample was removed.

Participating organisations nominated their project managers to participate and provided the researcher with a list of names and email addresses. The nominations were made after discussions with the researcher on how to select appropriate participants. This ensured that the participants were all currently fulfilling the role of project manager. The names and email addresses were used only to send instructions to participants. Each participant was sent an email that included instructions on how to complete the questionnaire, information on confidentiality of the data; and expectations in terms of feedback. Subjects were given four (4) weeks to complete the survey. Reminder notices were sent out at two (2) weeks and three (3) weeks to encourage participation.

Participants were informed that this was not a test and that their employer would not have access to their personal results. Participants were provided with the researcher's

contact details and were encouraged to communicate with the researcher about any questions, queries or concerns they had. The participants were also informed that their personal details including their email address would only be used to provide information to them individually regarding the study. Their personal information was not going to be used for any other purpose and their privacy would be protected at all times.

Organisations were made aware of the fact that all participant nominations into the study must be on a volunteer basis and any participant could withdraw at anytime without reason. Organisations were informed that the organisational identity may be used in conjunction with the other participating organisations when describing which organisations took part in the study but no organisational specific data would published.

After each organisational group of participants completed the questionnaire, individuals were sent confidential reports with their individual project management competence scores, their project complexity ratings from the CIFTER, their overall general self-efficacy score and their three (3) most frequently used coping strategies from each stressful situation. The organisation received a summary report of group information including the average project management competency scores for the group, the percentage of low, medium and high complexity projects within the group, the average general self-efficacy score and the three (3) most frequently used coping strategies from each stressful situation by the group.

5.3.2 Data Sample Design

The sample size for this study was set at two hundred (200) or more participants. In line with the positivist approach to the research design, regression analysis was planned to be conducted on the results to determine if primary, secondary appraisal, self-efficacy or project management skills are predictors of coping strategy selection. Sample size guidelines for regression analysis, vary between authors. The formulation for calculating the required sample size suggested by Tabachnick and Fiddel (2001) quoted in (Pallant, 2005) is $N > 50 + 8*m$ (m = number of independent variables). For this study the maximum number of independent variables used in a regression analysis was six (6) units of individual project management competence. By this

calculation the sample size for a regression analysis to be conducted is ninety (98). An alternative formulation is suggested by Stevens (1996) as quoted in (Pallant, 2005) who states that the sample size should be at least 15 times the number of independent variables. By this calculation the minimum sample size should be (15 X 6) = 90. A minimum sample size was set at twice the higher of the two (2) to allow for potential subdivision of the data into groups either by industry, country, gender or age.

For this study it was deemed desirable to have a relatively even spread of respondents across three broad industry types and one public sector group. Similar groupings have been used in other studies (Crawford, 2000b). The desired break down of participant numbers by industry is shown in table 6 below.

Table 6 - Planned Sample Distribution by Sector

Industry Sector	*Number of Participants*
Public Sector	50
Engineering & Construction	50
Business Services/Finance	50
IT & Telecommunications	50
Other including Manufacturing	unknown
Total Minimum	200

There are no hypotheses associated with industry classification, however to ensure the results are as generalisable as possible an even spread across the four major sector groups was planned.

The final sample includes 216 complete survey responses.

5.4 Data Collection Instruments

As discussed in Section 5.3 above this study required information to be collected across three (3) areas:

1. Project Management Culture
    a. Project Environment (including project management maturity)
    b. Individual Project Management Competence

2. Coping Strategy Selection
3. General Self-Efficacy

This section details the instruments used to assess and measure each component.

5.4.1 Project Environment

The environment in which project managers apply their project management skills is one of the two (2) key components of the project management culture as defined in this research. The term environment includes:

- Demographics of the project manager
    - Name
    - Current Role
    - Gender
    - Age
    - Primary country of work
    - Number of Year Project Management Experience
- Perceived project management maturity of employer organisation
- Type of projects being managed
- Complexity of the projects being managed

Name

Participants' names and identifying data were collected solely for the purposes of returning confidential assessment reports. Privacy was maintained at all times. This data was collected using the on-line registration form and was saved to a separate table within the database. The identifying data was linked to the individuals' responses only during the individual report generation process. This information was separated from the response information for all statistical analysis and kept confidential at all times. A non-identifying TestID was used in place of the names and email addresses.

Current Role

As with name and email address this information was collected purely for the purposes of generating individual reports. The nomination process for participants ensured that all were project managers however four (4) options were provided for selection by candidates, coded as PEQ03. This information was stored in the separate

registration table with the candidates' name and email address. The four (4) options were

1. team member
2. project manager
3. project director
4. program manager

The final sample contained 216 responses.

Gender

Gender was included in the questionnaire to allow for analysis of gender differences in project management competence, levels of general self-efficacy and coping strategy selection. The scale used was a nominal format where male = 1 female = 2, coded as PEQ04. The final sample contained 216 responses.

Age

Age related data was collected using a five point scale of age bands, coded as PEQ05. As the research was conducted in the workplace and across a global sample it was deemed inappropriate to request specific ages or dates of birth. Some of the countries involved have labour laws preventing organisations from asking employees their specific age. It was decided that this study should conform to the standards set by labour laws where ever possible. The item for age was as follows

1 = Under 25 years
2 = 25-30 years
3 = 31 – 40 years
4 = 41 – 55 years
5 = over 55 years

The final sample contained 216 responses.

Primary country of work

Primary country of work was asked to allow for a between country analysis of difference in individual competence, levels of general self-efficacy and coping strategy selection. The item was an open ended text field. These were regrouped by

the researcher to ensure consistent spelling of country names. The data is coded as PEQ06. The final sample contained 216 responses.

Number of Years Project Management and Project Manager Experience

Number of years' project management experience is a critical component of the hypothesis that project managers acculturise to a project management culture. The assumption is that the longer a person has been practicing project management the greater the change of acculturisation that will occur. Project management experience was collected as a single numerical value. A subset of this time, the number of years project manager experience was collected as a separate single numerical value, and these items of data were coded as PEQ07 and PEQ08 respectively. The final sample contained 214 valid responses with 2 missing results.

Perceived organisational project management maturity

The item for perceived organisational maturity is taken from Crawford's (2000b) project experience questionnaire. The single item uses a five (5) point scale as follows

1 = 'Initial, Ad hoc & Chaotic'

2 = 'Repeatable, PM System and Experience'

3 = 'Defined, Organisation Wide PM System'

4 = 'Managed, Stable and Measured Processes'

5 = 'Optimising, Organisation Focused on Continual Improvement'

Coded as PEQ09. The final sample contained 216 responses.

Type of projects being managed

Project type was measured using three (3) items. The factors that may affect the individual competence of a participant were taken from Crawford's (2000b) nature and context questionnaire and included the industry sector of the organisation, whether the organisation was public or private sector. This data was used to determine whether responses were coded as "public sector" in relation to Table 6 and finally whether projects were internal or external to the organisation.

a. Industry Sector

Participants were asked to nominate which industry sector their organisation operated in, coded as PEQ10. This information was used to investigate any potential between

industry differences in individual project management competence and perceived organisational project management maturity. Industry sector was assessed using a finite list of possible industry sectors. These included

1. Engineering & Construction
2. Business Services
3. IT & Telecommunications
4. Finance
5. Manufacturing
6. Other

Although only the four (4) key industries of Engineering & Construction, Business Services, IT & Telecommunications and Public Sector were of primary interest to this study the additional options of Finance and Manufacturing were included in the detailed questions to allow for a more detailed look at emerging industries where project management is being applied. Finance was combined with Business Services for the overall distribution statistics and Manufacturing was combined under "other". Public sector organisations could be listed as any of the four options. They were only coded once based on the pubic/private sector question below. The final sample contained 216 responses.

b. Public or Private Sector

Participants were asked whether their organisation was a public or private sector organisation, coded as PEQ11. This question was asked to allow for investigation into any potential differences in individual project management competence and perceived organisational project management maturity. This was a nominal item where

1. public sector organisations
2. private sector organisations

The final sample contained 216 responses.

c. Internal or External

This was measured with a simple nominal item, coded as PEQ12,

1. internal projects
2. external projects

The final sample contained 216 responses.

Complexity of the projects being managed

The complexity of projects was measured using the CIFTER factors from the GAPPS project manager standards. Participants were asked to describe two (2) of the most complex projects they had managed within the past three (3) years. This information was not used in any of the analysis conducted for this research. The question was asked purely to focus the participant's attention on two existing projects from which they could complete the CIFTER complexity rating and the individual competency assessment instrument.

The CIFTER includes seven (7) factors each with a four (4) point response scale. The factors and their four (4) scales are detailed in Table 7 below. Appendix 10 includes a full description of the CIFTER factors.

Table 7 - CIFTER Factor Table

Project Management Complexity Factor	***Descriptor and Points***			
1. Stability of the overall project context	Very high (1)	High (2)	Moderate (3)	Low (4)
2. Number of distinct disciplines, methods, or approaches involved in performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
3. Magnitude of legal, social, or environmental implications from performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
4. Overall expected financial impact (positive or negative) on the project's stakeholders	Low (1)	Moderate (2)	High (3)	Very high (4)
5. Strategic importance of the project to the organisation or organisations involved	Very low (1)	Low (2)	Moderate (3)	High (4)
6. Stakeholder cohesion regarding the characteristics of the product of the project	High (1)	Moderate (2)	Low (3)	Very low (4)
7. Number and variety of interfaces between the project and other organisational entities	Very low (1)	Low (2)	Moderate (3)	High (4)

The scores from each factor were totalled to create the CSUM score. The CSUM was used as the scaled score for complexity. The final sample included 408 valid responses. The higher sample size is due to the fact that each participant was asked to describe up to two recent projects. Total possible number of responses was 432. There were 24 blank responses resulting from either respondents only having managed one (1) project in the past 12 months or omitting to complete the survey.

The GAPPS standard provides a grading system for determining low complexity, moderate and high complexity projects. The CSUM was used to group the responses into three categories of complexity, below global level 1 (bG1), global level 1 (G1) and global level 2 (G2), coded as CGrade.

0. Below G1 where CSUM < 11
1. G1 where 11 <= CSUM < 19
2. G2 where CSUM >=19

The seven (7) items on the CIFTER complexity scale were subjected to principal components analysis using SPSS V15.0 Graduate Student Version. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .749, exceeding the recommended value of .6 and the Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. The full SPSS output can be found in the Appendix.

Principle component analysis revealed the presence of two components with Eigen values exceeding 1, explaining 35.85% and 19.44% of the variance respectively. An inspection of the Scree Plot revealed a clear break after the second component confirming the two-factor model. All items loaded to component one except for items PCQ02 and PCQ07, stability of the overall project context and stakeholder cohesion regarding the characteristics of the product of the project. These two (2) factors are similar in content with much stability of the context being driven by conflicting stakeholder understandings or expectations about the purpose and output of the project. This may explain these two (2) factors loading onto a separate component. The table below details the loadings onto each component.

Table 8 - Component Matrix CIFTER Factor Analysis

	Component	
	1	2
PCQ08	.754	
PCQ05	.714	
PCQ03	.710	
PCQ04	.694	
PCQ06	.652	
PCQ07		.824
PCQ02		.793

Extraction Method: Principal Component Analysis. 2 components extracted.

The factor analysis revealed a possible two-factor solution for a scale that is intended to provide a single measure of complexity. Further analysis of the internal reliability revealed a low Cronbach Alpha of .646 from a sample of 408 responses. This is below the recommended .7 (Nunnally, 1978, 245). Further analysis of the results revealed that the removal of items PCQ02 and PCQ07 would significantly increase the internal consistency of the CIFTER. The removal of these two scales increased the Cronbach Alpha to .747 on five item measure. These two items are consistent with the factor analysis reported above.

The following results are based on the resultant 5-item CIFTER. The CSUM scores are adjusted accordingly resulting in the following groupings (coded as CGraderevised)

0. Below G1 where CSUMRevised < 7.86
1. G1 where 7.86 <= CSUMRevised < 13.57
2. G2 where CSUMRevised >=13.57

The complexity scores based on the reduced five-item assessment instrument are shown in the figures below. The average score is 12.96 indicating a moderate level of complexity. The standard deviation is 2.571 from an N=408.

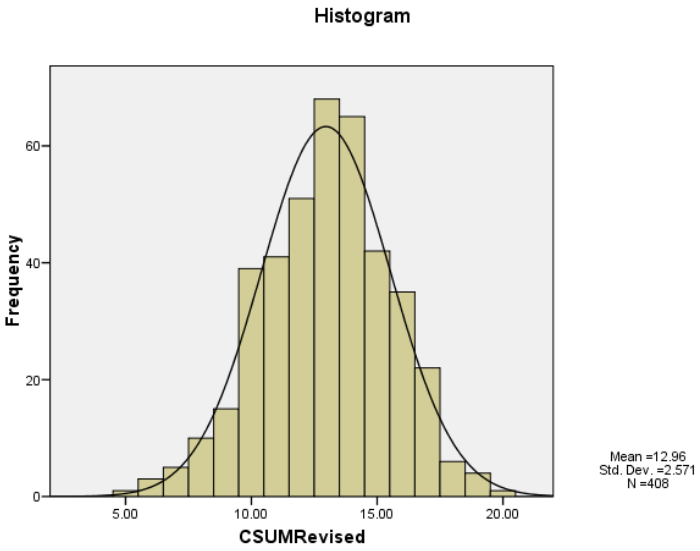

Figure 10 - Complexity Score Distribution

The CSUMRevised scores are grouped into the three groups of low, moderate and high complexity. The majority of the sample, 51.9% reported working on projects of moderate complexity. A larger than expected proportion of respondents, 40.5%, reported working on very complex projects. This may be due to inaccuracies in the perception of complexity of projects and further research is recommended however this is outside the scope of the current research.

Table 9 - Complexity Grade Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	9	2.1	2.2	2.2
	2.00	224	51.9	54.9	57.1
	3.00	175	40.5	42.9	100.0
	Total	408	94.4	100.0	
Missing	System	24	5.6		
Total		432	100.0		

The figure below illustrates the frequency of complexity ratings and the normal curve showing the majority of responses in the G1, moderately complex range with a skew towards the very complex rather than low complexity range.

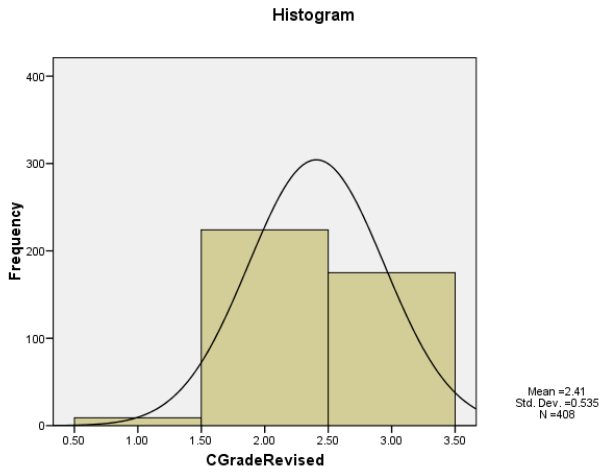

Figure 11 - Complexity Level Distribution

a. Current Role

The final sample contained 62.5% self nominated project managers, 9.7% as project directors, 20.8% as programme manager and only 6.9% rated themselves as operating at below the level of a project manager.

b. Gender

The gender distribution is skewed towards a male sample with 69.9% of the sample being male and 30.1% female. This distribution is indicative of the project management industry which is traditionally male dominated having originated in the construction, engineering and defence industries. These results are consistent with previous studies (Crawford, 2000b, Aitken and Crawford, 2006, Aitken and Crawford, 2008).

c. Age

The final sample contains no data from respondents under the age of 25 years. 25.5% are 31-55 years, the majority of respondents (56%) are between the ages of 41-55 years and 11.6 are over 50 years old.

d. Primary Country of Work

Australia dominates the sample with 63.4% of the sample nominating Australia as their primary country of work. Great Britain provided 10.6% of the sample Singapore 9.3%, South Africa 5.6% and North America 7.4%. The heavy skew towards Australia will limit the generalisability across different cultures. However, the Australian, NZ, British, North America results make up a total of 81.9% of the sample thus providing the possibility of generalisability of the results across developed western nation populations.

e. Number of Years Project Management and Project Manager Experience

The full sample contained N=214 valid responses; the number of years project manager experience was on average 3 years less than the total number of years project management experience. The standard deviation was very high for both measures with 8.184 and 7.436 years respectively. Thus the sample has a wide range of number of years experience within it. And the ranges were 1 to 45 years and 0 to 30 years. Overall the number of years experience is varied and no clear patterns are immediately observable.

f. Organisational Project Management Maturity

The mean score for the sample is 2.99 out of a possible 5, indicating an average competence of "Defined, Organisation Wide PM System". The normal curve is situated relatively evenly across the 5-point scale with standard deviation being moderately high at 1.189.

g. Industry

The distribution across industries was relatively even with figures approximating those anticipated in the research design with no one industry dominating the sample. The major deviation from the research design is the expected 25% of the sample coming from Business Services. Business Services only provided 4.2% of the sample. This deviation from expectation is explained by the change to the final survey question to extract Finance out as a specific option rather than group it within Business Service. The combined total of Business Services and Finance is 22.7% of the total sample. Engineering and Construction provided the most respondents with

26.9% and IT & Telecommunications provided 19.4%. Overall the results are evenly enough spread to provide generalisability of the results across industry.

h. Organisation Type

The research design anticipated that 25% of the sample would be public sector with the remaining 75% of the sample being spread across a range of private sector organisations. The final sample contains 17.1% public sector project managers. The relative weighting of the sample and the small absolute number of public sector respondents will result in the generalisability of the research being more readily applied to the private sector than the public.

i. Project Type

The research design did not include an anticipated division of internally and externally run projects. The final sample includes a relatively even split between the two with 58.8% of the sample typically managing internal (to the organisation) projects and 41.2% running projects for clients external to the organisation. The results of this study are likely to be generalisable across these aspects of project type.

5.4.2 Individual Project Manager Competence

The aim of this study is to investigate the influence of project management culture on the coping strategy selection of project managers. One of the core components of the project management culture as defined in this research is the level of project management practice demonstrated by an individual within their job role. Although competency is a complex multi-faceted construct, for the purposes of this study the actions of applying project management have been selected as the most influential component of project management competence on the construct of project management culture. In Crawford's (2000b) integrated model of individual project management competence (see figure 1) competence is described as including input competencies, personal competencies and output competencies. For the purposes of this research output competencies in the form of demonstrable performance (in accordance with occupational/professional/organisational Competency Standards) have been selected to represent the individual project management competence component of the project management culture concept.

As discussed in the literature review there a number of performance based project management standards that can be applied to the assessment of demonstrable competence. The standard selected for this study is the GAPPS project manager standards.

The GAPPS standard was selected for a number of reasons. First, the GAPPS standards are the most recent performance based standards to be developed. As project management is an evolving practice and as new industries embrace and modify project management to suit their business needs, standards must also evolve. Using the most recently developed standards ensures that the assessment uses criteria that are most relevant to today's project manager role. Secondly, the GAPPS standard is the first standard to be independently developed by a group that is truly globally represented. The GAPPS standard has had contributions from the UK, Australia, USA, China, Russia, Indonesia, Singapore, New Zealand, Japan, the Netherlands, South Africa and Canada and has drawn upon all other standards with a view to providing a basis for mutual recognition. For this reason also, the GAPPS standards are essentially simpler and less extensive than other (national) standards and this was considered beneficial in terms of survey design and user acceptability.

The research design for this study is to conduct the questionnaire via the Internet to a global audience. Using a globally developed and relevant standard enhances the alignment between the questionnaire and global project management practice. Finally, the GAPPS standard is the first independently developed standard ensuring that it is free from existing product influence and single owner bias. The GAPPS standard was developed with input from academic institutions, professional associations and private industry both large and small.

The instrument design for data collection is based on the instrument developed and used by Crawford (2000b). Wherever possible, in this study, existing data collection instruments have been selected to reduce the risk of instrument design failure. Although performance based competencies are usually assessed in the workplace by a workplace assessor who is able to verify claims of competence through a face-to-face interview in which evidence is reviewed and approved, this was not possible in this

study due to cost and logistical issues. Instead, a self-assessment of project management competence against the GAPPS standard was conducted. Crawford (2000b) successfully used this model of assessment in her research into the value of project management standards in the assessment of project management personnel.

Although self assessment as a mode of data collection has inherent problems regarding reliability, these are discussed in more depth in Section 5.4.5. Using a consistent perspective (the self) for data capture was deemed appropriate for the current study. To reduce the risk of reliability with self assessment instruments this study has chosen to use a collection of well tested and proven instruments for not only the assessment of project management culture but also coping and generalised self efficacy. Sections 5.4.3 and 5.4.4 provide more detailed discussion of these instruments.

The GAPPS standard details the activities that a project manager must do themselves in order to provide evidence that they are competent. The standards include six (6) units, twenty-one (21) elements and sixty-four (64) performance criteria. Each performance criteria describes "what" the project manager must do (not "how") and provide evidence for. The full standard is shown in Appendix C. The performance criteria are used as the questions within the questionnaire.

The assessment instrument uses a five (5) point rating scale based on the scale developed by Crawford (2000b) to assess the level of application of each performance criteria.

Team members in projects generally only assist with completing the activities required by a project manager as documented in the GAPPS standard; project managers do the activities themselves and project directors / program managers, as managers of project managers, manage people who do the activities. For the purposes of evaluating project manager competence relative to the GAPPS standard the scale must provide a means of measuring the level of application of activities.

Respondents were asked to describe two (2) projects they have managed in the past three (3) years, rate the complexity of each project (discussed above) and then in

relation to these two projects rate their application of project management skills and techniques as defined by the GAPPS standard. The wording of the scale as provided in the standard has been altered to relate the performance criteria to these two (2) specific projects. The scale is as follows:

Raw Score	**Scale**
1	I did not do this on either of the projects I described
2	I did this as a team member under supervision on one or both of the projects I described
3	I did this myself on one of the projects described
4	I did this myself on both of the projects described
5	I did not do this myself but I managed others doing this on one or both of the projects I described

Figure 12 - Self Assessment Rating Scale against the Global Alliance for Project Performance Standards Project Manager Standards

The specificity of the scale, focusing responses on two (2) named projects, is an enhancement on the method used by Crawford (2000b) which only asked for a general assessment of which activities had been performed on any project in the past three (3) years. This increase in specificity was designed to increase the accuracy of the self assessment mode of data capture by directly linking performance with a specific project. The new approach also aligns the instrument design and application with the situational rather than dispositional focus of the Brief COPE being used in this study for the assessment of coping strategy selection.

One of the key benefits of this rating scale for application of project management skills and techniques is that it does not ask participants to make a subjective judgment about their abilities. It asks them to objectively state whether they did or did not do a particular task and if they did a task was it done according to the description for items 2, 3, 4 or 5 of the scale. Although this increases accuracy by reducing subjectivity, one of the limitations of this scale is that it does not include a rating of quality i.e. if an activity was done, was it done well. This is an acknowledged limitation and can be followed up with further research where face-to-face interviews can be conducted to verify the quality of the evidence. This kind of research would need to be based on a smaller sample size. For the purposes of this research a larger sample size enabling

wider generalisation of the results was deemed to be more important than overcoming this limitation.

The scale is used to create individual competency scores at each of the six (6) units and the twenty-one (21) elements and sixty-four (64) individual performance criteria. The raw scores are summed for all performance criteria associated with each unit to create the six (6) unit scores, CQ1 through to CQ6. A total competency score (CQSUM) was also computed as the sum of the six (6) unit scores. The table below details the units and elements and the number of performance criteria associated with each. The final sample contained 215 valid responses with one (1) missing value.

Item Number	Units and Elements	Number of Performance Criteria
CQ1	**Manage Stakeholder Relationships**	
CQ1.1	Ensure that stakeholder interests are identified and addressed.	4
CQ1.2	Promote effective individual and team performance.	5
CQ1.3	Manage stakeholder communications.	3
CQ1.4	Facilitate external stakeholder participation.	2
CQ2	**Manage Development of the Plan for the Project**	
CQ2.1	Define the work of the project.	6
CQ2.2	Ensure the plan for the project reflects relevant legal requirements.	2
CQ2.3	Document risks and risk responses for the project.	3
CQ2.4	Confirm project success criteria.	2
CQ.25	Develop and integrate project baselines.	5
CQ3	**Manage Project Progress**	
CQ3.1	Monitor, evaluate, and control project performance.	4
CQ3.2	Monitor risks to the project.	4
CQ3.3	Reflect on practice.	2
CQ4	**Manage Product Acceptance**	
CQ4.1	Ensure that the product of the project is defined.	2
CQ4.2	Ensure that changes to the product of the project are monitored and controlled.	3
CQ4.3	Secure acceptance of the product of the project.	2
CQ5	**Manage Project Transitions**	
CQ5.1	Manage project start-up.	2
CQ5.2	Manage transition between project phases.	3
CQ5.3	Manage project closure.	2
CQ6	**Evaluate and Improve Project Performance**	
CQ6.1	Develop a plan for project evaluation.	2
CQ6.2	Evaluate the project in accordance with plan.	2
CQ6.3	Capture and apply learning.	4
	Total Number of Performance Criteria	**64**

Table 10 - Global Alliance for Project Performance Standards Project Manager Standards - Number of Performance Criteria

Internal Consistency

The internal consistency for each of the six (6) units is high ranging from .854 to .925, all of which are above the recommended .7 (Nunnally, 1978). The table below details the scores for each unit.

Table 11 - Reliability of Scales based on average scores at Unit Level (GAPPS)

Unit	Cronbach Alpha
CQ1	.909
CQ2	.924
CQ3	.854
CQ4	.922
CQ5	.879
CQ6	.925

Overall Individual Competency Score

The Cronbach Alpha score for CQSUM = .915 is above .7 and demonstrates strong internal consistency. The mean for the sample is 21.81 from a possible 30, and the standard deviation is relatively small at 4.02. Fully competent project managers should score between 18 and 24, and the mean of 21.82 falls between these two figures. Based on the CQSUM scores the sample being analysed is on average fully competent project managers. This is ideal for this study which seeks to isolate the coping strategies of project managers. No firm pre-selection filter was placed on participants to the study to ensure that project managers were selected. The organiser within each company was instructed to only send the invitation to those people who were thought to be project managers within the organisation. However it was recognised that this is not a robust means of ensuring the sample focused solely on project managers and left the study open to self-selection. Based on review of the literature and observation of the practicalities of survey data capture it was decided that the first filter for participation would be through the organiser within each organisation and that the final filter would be the analysis of data from the individual competency questions. The assumption applied is that the sample would be deemed to be sufficiently focused on project managers if the results of the individual competency assessment were found to be predominantly within the range of fully competent.

Table 12 - Descriptive Statistics for CQSUM

N	Valid	215
	Missing	1
Mean		21.8079
Std. Deviation		4.02704
Minimum		10.01
Maximum		29.27

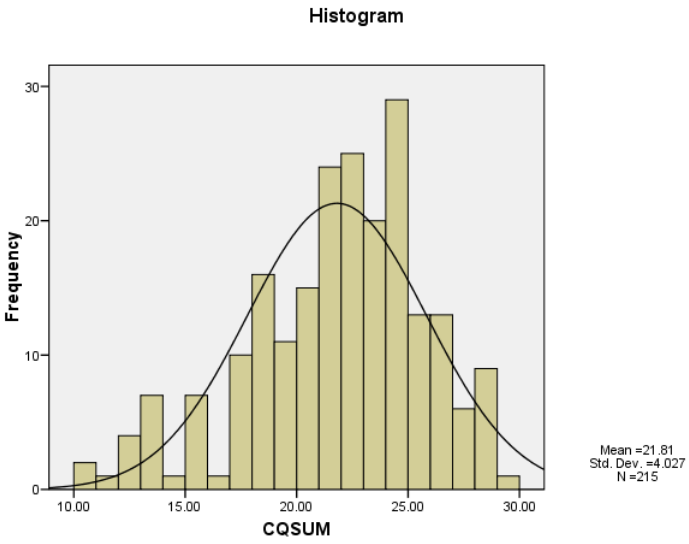

Figure 13 - Distribution of Individual Competency Scores (CSUM)

Factor Analysis of the Single Individual Competency Score

A factor analysis was conducted, and the six (6) unit scales were subjected to a principal component analysis using SPSS Version 15 Graduate Student version. Inspection of the correlation matrix identified a number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value is .903, exceeding the recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. The full details of the analysis can be found in the Appendix Section 12.1.2.

Principal component analysis revealed one factor with an eigenvalue greater than 1 explaining, 73.262% of the variance. An inspection of the Scree Plot shows a clear break is evident after the first factor confirming the single component model. The solution revealed strong loadings and all scales loading substantially on the one factor.

This means that all six (6) components of the individual project manager competency assessment are measuring the same concept. The table below shows the loadings.

	Component
	1
CQ3	.904
CQ2	.902
CQ5	.870
CQ1	.838
CQ4	.837
CQ6	.778

Table 13 - Component Matrix CQSUM Factor Analysis

5.4.3 Coping Strategy Selection

Coping strategy selection is the primary focus of this study. The aim is to identify which coping strategies project managers select when dealing with stressful situations at home, in the workplace and do to with personal health. As discussed in the literature review there are a number of models for coping and as many possible instruments for measuring coping strategy selection. The Brief COPE instrument was selected for this study for several reasons. First, it is closely aligned of with the transactional model of coping selected as the basis for the research design. Secondly, the instrument can be used both dispositionally and situationally which provides scope for flexibility in the research design. Thirdly, the instrument has been used successfully in a number of research projects and resulted in consistently satisfactory internal consistency scores. Finally, the Brief COPE is as the title suggests short. One of the major considerations when selecting a coping strategy selection instrument was the practicality of including it in the full questionnaire considering the length of the other instruments and the fact that the coping strategy selection instrument needed to be repeated three (3) times by each participant.

a. Stressful Situation Description

Participants were asked to describe a stressful situation that had occurred in the past twelve (12) months in each of the three (3) areas

1. At work
2. At home (involving family and or friends)

3. With their personal health (or other personal situation that was not caused by interaction with others)

b. Stressfulness of the Event

Participants were asked to rate the stressfulness of each event on a scale of one (1) to one hundred (100), coded at CSW04, CSH04 and CSP04. This measure was used to investigate whether the severity of the stress from a particular situation affected the selection of coping strategies. The severity of the stress is not hypothesized to affect the results however the literature has shown that coping strategy selection can be mediated by a number of factors. This measure and the type of stressful situation were used to investigate the effect of situation specific factors on coping strategy selection. The final sample included CSW04 N = 216, CSH04 N = 216 and CSP04 N = 184. Additional questions relating to the type of event being described were asked including "Was it an anticipated problem or situation?" ranked on 5 point Likert scale from Totally Unexpected through to Totally Expected, coded at CSW02, CSH02 and CSP02 with final samples of N=216, N=126 and N=187 respectively. And "Was the problem or situation a single event or a more long-lasting chronic situation?" with options for

1. Single Event
2. Chronic Situation

This was coded at CSW03, CSH03 and CSP03 with final sample sizes of N=216, N=126 and N=184 respectively. As with the severity of the stress these latter two questions were not formally incorporated into the hypotheses however they were considered potential influences on the coping process.

d. Primary Appraisal

As a measure of primary appraisal of control participants were asked two (2) questions. The first question asked "Did you view this event as a threat or a challenge?" Respondents were asked to rate each stressful event described on a five (5) point scale where one (1) was described as a Threat and five (5) a Challenge. Coded as CSW05, CSH05 and CSP05 with final sample sizes of N= 216, N=216 and N=185 respectively.

The second question asked them to rate each stressful event described on a five (5) point scale where one (1) was described as ‘completely unchangeable I just had to accept it’ through to five (5) described as ‘completely within my control to change the situation’. Coded as CSW06, CSH06 and CSP06 with final sample sizes of N= 216, N=216 and N=186 respectively.

e. Coping Strategy Selection

Participants were then asked to rate their application of each of the following coping strategies using the four (4) point scale.

1 = I haven't been doing this at all

2 = I've been doing this a little bit

3 = I've been doing this a medium amount

4 = I've been doing this a lot

Coping Strategies

1. I turned to work or other activities to take my mind off things.
2. I concentrated my efforts on doing something about the situation I'm in
3. I said to myself "this isn't real."
4. I used alcohol or other drugs to make myself feel better
5. I received emotional support from others
6. I gave up trying to deal with it
7. I took action to try to make the situation better
8. I refused to believe that it had happened
9. I said things to let my unpleasant feelings escape
10. I sought help and advice from other people
11. I used alcohol or other drugs to help me get through it
12. I tried to see it in a different light, to make it seem more positive
13. I criticized myself
14. I tried to come up with a strategy about what to do
15. I received comfort and understanding from someone
16. I gave up the attempt to cope
17. I looked for something good in what is happening
18. I made jokes about it
19. I did something to think about it less, such as going to

movies, watching TV, reading, daydreaming, sleeping, or shopping

20. I accepted the reality of the fact that it had happened
21. I expressed my negative feelings
22. I tried to find comfort in my religion or spiritual beliefs
23. I tried to get advice or help from other people about what to do
24. I learnt to live with it
25. I thought hard about what steps to take
26. I blamed myself for things that happened
27. I prayed or meditated
28. I made fun of the situation

The twenty-eight (28) items form fourteen scales coded as follows

Scale	Code for Work-based Stressor	Code for Home-based Stressor	Code for Personal Health Stressor
Self-distraction	CSW_SD	CSH_SD	CSP_SD
Active coping	CSW_AC	CSH_AC	CSP_AC
Denial	CSW_D	CSH_D	CSP_D
Substance use	CSW_SU	CSH_SU	CSP_SU
Use of emotional support	CSW_UES	CSH_UES	CSP_UES
Use of instrumental support	CSW_UIS	CSH_UIS	CSP_UIS
Behavioural disengagement	CSW_BD	CSH_BD	CSP_BD
Venting	CSW_V	CSH_V	CSP_V
Positive reframing	CSW_PR	CSH_PR	CSP_PR
Planning	CSW_P	CSH_P	CSP_P
Humour	CSW_H	CSH_H	CSP_H
Acceptance	CSW_A	CSH_A	CSP_A
Religion	CSW_R	CSH_R	CSP_R
Self-blame	CSW_SB	CSH_SB	CSP_SB

Internal Consistency

An analysis of the internal consistency of the Brief COPE as applied to the current sample was conducted on the 14 item model. The resultant Cronbach Alphas are .678 for the Brief COPE as applied to work-based stressors, .697 for home-based stressors and .795 for personal health stressors. All are close to or above the .7 recommended

by Nunnally (1978) and over the .5 used as the minimum measure by Carver (1997) in his validation study of the Brief COPE. The table below includes the detailed item statistics for each sub-scale for each application of the Brief COPE.

Table 14 - Item Statistics Brief Cope Internal Reliability Analysis

	Mean	Std. Deviation	N		Mean	Std. Deviation	N		Mean	Std. Deviation	N
CSW_SD	4.3628	1.62012	215	CSH_SD	4.5721	1.91969	215	CSP_SD	4.2184	1.85563	174
CSW_AC	7.0698	1.31837	215	CSH_AC	5.9721	1.83404	215	CSP_AC	5.9540	1.97035	174
CSW_D	2.5907	1.11904	215	CSH_D	2.7256	1.23578	215	CSP_D	2.6724	1.24540	174
CSW_SU	2.4419	.91973	215	CSH_SU	2.6093	1.24402	215	CSP_SU	2.6552	1.48851	174
CSW_UES	4.5395	1.74470	215	CSH_UES	4.7721	2.06419	215	CSP_UES	4.6954	1.99255	174
CSW_UIS	5.5628	1.74402	215	CSH_UIS	4.8744	2.06394	215	CSP_UIS	5.1437	2.28517	174
CSW_BD	2.4372	.92953	215	CSH_BD	2.8093	1.28467	215	CSP_BD	2.6494	1.19637	174
CSW_V	4.2651	1.54963	215	CSH_V	4.0186	1.74806	215	CSP_V	3.4253	1.59937	174
CSW_PR	5.2791	1.72564	215	CSH_PR	5.0047	2.02669	215	CSP_PR	3.9943	2.10833	174
CSW_P	7.0558	1.22537	215	CSH_P	6.3023	1.78696	215	CSP_P	5.6494	2.04518	174
CSW_H	4.5581	1.84824	215	CSH_H	3.6093	1.94934	215	CSP_H	3.6782	2.01437	174
CSW_A	6.2558	1.53302	215	CSH_A	6.1256	1.81583	215	CSP_A	5.8218	1.94947	174
CSW_R	3.1767	1.82055	215	CSH_R	3.3628	2.04357	215	CSP_R	3.0575	1.78857	174
CSW_SB	3.2651	1.47548	215	CSH_SB	3.2651	1.65463	215	CSP_SB	3.4540	1.91002	174

The analysis of internal consistency was taken down one more level to the individual scales within the Brief COPE. The alphas range from .467 through to .940 with the majority of scales scoring above .7. The self-distraction scale scored above .7 in the home-based stressor application but below for the other two (2) domains. Denial scored below .7 for all three (3) domains as did Behavioural Disengagement and Acceptance. The strongest scales with Cronbach Alphas above .7 for all three (3) domains included; Active Coping, Substance Use, Using Emotional Support, Using Instrumental Support, Positive Reframing, Planning, Humour, Religion and Self Blame. Overall the results are similar to those found in previous studies using the Brief COPE (Carver, 1997, Fillion et al., 2002, Aitken and Crawford, 2006).

Scale	Cronbach Alpha for Work-based Stressor	Cronbach Alpha for Home-based Stressor	Cronbach Alpha for Personal Health Stressor
Self-distraction	.467	.711	.685
Active coping	.715	.749	.821
Denial	.598	.660	.681
Substance use	.901	.885	.940
Use of emotional support	.772	.864	.884
Use of instrumental support	.807	.877	.930
Behavioural disengagement	.579	.490	.551
Venting	.588	.755	.690
Positive reframing	.707	.786	.852
Planning	.748	.725	.847
Humour	.866	.909	.902
Acceptance	.495	.610	.682
Religion	.883	.932	.904
Self-blame	.739	.843	.828

Table 15 - Internal Consistency Brief COPE

Factor Analysis

The 14 scales from the Brief COPE were subjected to a principal component analysis using SPSS Version 15.0 Graduate Student Version for each domain work, home and personal health stressors. The results are as follows

i. Work-based Stressor Factor Analysis

Inspection of the correlation matrix identified a moderate number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.669, exceeding the recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed five factors with eigenvalues greater than 1 explaining, 20.175 %, 16.047 %, 9.182 %, 8.997 % and 7.449% of the variance

respectively. The five factor model explained 61.848% of the overall variance. However, from further inspection of the Scree Plot a clear break was evident after the second factor. A Varimax rotation was performed on the basis of a two-factor model. The rotated solution revealed a simple structure with both factors showing strong loadings and most scale loading substantially on only one factor. Only two scales, Using Instrumental Support and Using Emotional Support loaded onto both components. The first factor included Planning, Active Coping, Positive Reframing, Acceptance and Using Instrumental Support. The second factor included Using Emotional Support, Venting, Religion, Denial Self-Distraction, Behavioural Disengagement, Self-Blame and Substance Use. Humour did not load to either factor. The full analysis is detailed in the Appendix below.

ii. Home-based Stressor Factor Analysis

Inspection of the correlation matrix identified a moderate number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.691, exceeding the recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed four factors with eigenvalues greater than 1 explaining, 21.993 %, 15.719 %, 10.395 %, and 8.386% of the variance respectively. The four factor model explained 56.493% of the overall variance. However, from further inspection of the Scree Plot a break was evident after the second factor. A Varimax rotation was performed on the basis of a two-factor model. The rotated solution revealed a simple structure with both factors showing strong loadings and all but one scale loading substantially on only one factor. Only Venting loaded onto both components with a stronger loading to Component 2. The first factor included Planning, Active Coping, Positive Reframing, Acceptance and Using Instrumental Support, Humour, Using Emotional Support and Religion. The second factor included Venting, Denial Self-Distraction, Behavioural Disengagement, Self-Blame and Substance Use and Denial. The full analysis is detailed in the Appendix below.

iii. Personal Health Stressor Factor Analysis

Inspection of the correlation matrix identified a moderate number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.796, exceeding the

recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed four factors with eigenvalues greater than 1 explaining, 29.843 %, 13.941 %, 8.164 %, and 7.611% of the variance respectively. The four factor model explained 59.558% of the overall variance. However, from further inspection of the Scree Plot a break was evident after the second factor. A Varimax rotation was performed on the basis of a two-factor model. The rotated solution revealed a simple structure with both factors showing strong loadings most scales loading substantially on only one factor. Only Venting and Substance Use loaded onto both components with a stronger loading to Component 2. The first factor included Planning, Active Coping, Positive Reframing, Acceptance and Using Instrumental Support, Humour, Using Emotional Support and Religion. The same scales that loaded onto Component 1 from the home-based stressor factor analysis described above. The second factor included Venting, Denial Self-Distraction, Behavioural Disengagement, Self-Blame and Substance Use and Denial. The full analysis is detailed in the Appendix below.

These results are similar to that found in previous research by Aitken & Crawford (2006) who found a five (5) factor model and some research studies have found three and four factor models (Livneh et al., 1996, Hudek-Knezevic et al., 1999). However it is contrary to other research using the COPE and Brief COPE instruments, where an 8, 9 or 11 factor model is commonly found (Carver et al., 1989, Carver, 1997, Fillion et al., 2002). Although Carver emphasises that the Brief COPE is not designed to assess the dichotomous coping construction of problem-focused and emotion-focused coping as postulated by Folkman and Lazarus (1984a) the two factors found in this study can broadly be described as such.

f. Overall Stress Levels

Although the model of coping being used as the basis of the research design draws a clear distinction between the process for selecting and applying coping strategies and the adaptive outcomes of that application the overall level of perceived stress was considered important. A single item question was included that asked candidates to rate their current level of stress on a scale of zero (0) to one-hundred (100) where zero

(0) is defined as not stressed at all and one-hundred (100) is extremely stressed. The final sample included 216 valid responses.

5.4.4 Generalised Self-Efficacy

The transactional theory of coping includes a component of control or self-belief in an ability to alter or affect the outcomes of stressful events. The model posits that this element of control will be measurable at the point of secondary appraisal where subjects must decide "*what can be done?"* about the situation. The model itself is not specific in regards to how this sense of control is created or how it may be driven. This study aims to extend the understanding of the control aspect of the model by including a measure of general self-efficacy. A generalised measure rather than a situation specific measure was selected for two reasons. First, situation specificity is difficult to assess in relation to the three (3) stressful events being investigated. The situational aspect of each event will differ with too many categories to allow for meaningful statistical analysis. Secondly, the practicality of questionnaire length was a concern for this study. A situation assessment of self-efficacy would involve repetition of the self-efficacy instrument three (3) times significantly increasing the length of the questionnaire. Thus a general self-efficacy measure was selected. An attempt was made to reduce the breadth of the assessment by applying the measure to the management of stressful events.

Participants were asked to rate each of the ten (10) questions using the following four (4) point scale when thinking about how they approach and manage stressful events in general.

1. Not at all true
2. Barely true
3. Moderately true
4. Exactly true

Questions

1. I can always manage to solve difficult problems if I try hard enough
2. If someone opposes me, I can find a means and ways to get what I want
3. It is easy for me to stick to my aims and accomplish my goals
4. I am confident that I could deal efficiently with unexpected events
5. Thanks to my resourcefulness, I know how to handle unforseen situations

6. I can solve most problems if I invest the necessary effort
7. I can remain calm when facing difficulties because I can rely on my coping abilities
8. When I am confronted with a problem, I can usually find several solutions
9. If I am in trouble, I can usually think of something to do
10. No matter water come my way, I'm usually able to handle it

The final general self-efficacy score is calculated by summing the points for each question producing GSUM with a maximum score of forty (40) and a minimum of ten (10). A mean score can also be used. In many previous studies the mean has been approximately 2.9 (Schwartzer, 2007). The mean in this study is 3.386. The final sample included 216 valid responses.

Internal Consistency

An analysis of the internal consistency of the GSE as applied to the current sample was conducted on the 10 item model. The Cronbach Alpha is .882, well above the recommended minimum of .7 (Nunnally, 1978), demonstrating strong internal consistency.

Table 16 - Scale Statistics (GSE) Internal Reliability

Mean	Variance	Std. Deviation	N of Items
33.86	18.337	4.282	10

Factor Analysis

The GSE is intended to measure a single component. To verify that the results from this study are consistent with this a factor analysis was conducted expecting to obtain a single factor model. Inspection of the correlation matrix identified a number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.913, exceeding the recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed a single factor with an eigenvalue greater than 1 explaining 48.966% of the variance. Inspection of the Scree Plot confirmed the

single factor model; a break was evident after the first factor. All ten (10) items loaded onto the single factor. The full statistics are available in the Appendix Section 12.1.6.

5.4.5 Self-Assessment Bias and Accuracy

This study relies entirely on self-report assessments for both the project management and psychological instruments. The decision to use only self-report data is a deliberate decision by the researcher to use one methodology for data collection and not apply a mixed methodology of quantitative and qualitative data or use informant reports. However the use of self-report data has come under scrutiny by researchers in both the performance assessment research field and the field of psychology. These two perspectives are discussed below.

a. Performance Assessment

The individual project management competency assessment instrument being applied in this study measures work-place application of project management skill. This form of assessment is often conducted as part of performance assessment within organisations and as such the accuracy and potential biases that apply to performance assessment are relevant to this study. Dingle in his paper discussing the analysis of management competence states that *"self assessment, which is the only practical way to get information on the competences actually required and used by managers, is inevitably subjective"* (Dingle, 1995, 36). However he goes on to report that respondents are inherently truthful rather than dishonest and therefore accuracy of assessment is more a function of accessing the right information than by minimizing bias. This suggests that the quality of data captured in self-assessments of performance is critically dependent on questionnaire design and motivators for honesty. Farh and Dobbins (1989) studied the effect of comparative performance information on the accuracy of self-ratings and found that individuals were better able to judge their own performance more accurately when given large amounts of comparative performance data from their peers. This suggests that individuals are able to judge performance in relation to a range of performance outcomes better than they are able to make absolute and objective judgements. These results have significant implications for the standard performance assessment scales used by human resource

departments which typically ask individuals to rate their performance on a basic, sound, advanced or expert scale. These often come with descriptors of what the objective demonstration of performance would be at each of these levels however without a wealth of comparative performance data this research suggests that self-assessments on this basis would be inaccurate. The implication for this research from these findings is that the self-assessment of individual project management competence is conducted using an objective scale consisting of "yes/no" type responses rather than a subjective quality of performance rating. Within the scope of this research it is not possible to provide comparative performance data of a depth and quality to all participants to allow them to form an accurate picture of their own performance relative to the final sample. This instrument design, the inherent honesty of participants, discussed by Dingle (1995) and the guarantee to all participants of complete anonymity of data, particularly from current and potential employers is expected to result in accurate self-report data from the individual project management competence instrument.

b. Psychological Assessment

The use of self report data in psychological testing has been established as acceptable and is the most commonly used form of assessments. Vazire (2006) reports that 98% of the articles in the Journal of Research in Personality (JRP) in 2003 used self-reports and for 70% of these this was the only measure collected. Although *"the self is often considered the single best expert when it comes to knowing how a person typically behaves"* (Vazire and Mehl, 2008, 1202) and the use of self-report data has been prolific it has not gone unquestioned. Shrauger and Osberg (1981) suggest that there are two underlying reasons for the scepticism surrounding self report data. First, there is the psychoanalytic concept that people are usually unaware of some of their most important feelings and are, therefore, often not capable of appraising themselves accurately. Secondly there is a tendency for people to present themselves to others in socially desirable ways. With these doubts and the importance of self-report data to psychological research the question of accuracy of self report data is pivotal. Vazire and Mehl (Vazire and Mehl, 2008) explore these questions in their study, *Knowing Me, Knowing You: The Accuracy and Unique Predictive Validity of Self-Ratings and Other-Ratings of Daily Behavior.* This study found that self-report data is as accurate as informant report data however each perspective is a better predictor for certain

behaviours. Similarly, McCrae (1982) found that from a sample of 281 participants self and spouse ratings correlated highly across eighteen (18) traits from the NEO (neuroticism, extraversion and openness) scale. Research reported in both of these studies from various sources report a wide range of results from no correlation to high correlations between self and informant reporting. There is no consistency of results and most point to the conclusion that self-report data is more accurate in measuring some types of personality and behavioural components and informant reports are more effective with other personality and behavioural components. The context in which the assessment is conducted is likely to be a significant influence.

Additional to the variable results found for the accuracy of self and informant reports, Farh and Dobbins (1989), in their study of effect of comparative performance data on the accuracy of self and supervisor ratings discuss a range of potential reasons for the differences in self and supervisor ratings which cast doubt on the validity and accuracy of this kind of informant report. They provide three significant reasons for potential differences in self and supervisor ratings including; systematic rater biases whereby each rater has a unique perspective and focuses on different facets of job performance and differences in basic psychological processes, such as the actor-observer difference.

The impact for this study is that with strong internal consistency and factor analysis results and the use of psychometrically proven self-report instruments the potential for inaccurate data is considered to be low and therefore self-report data is an appropriate means of data collection. The variation in the quality of informant reporting discounts the value of the use of this type of information as a means of ensuring data accuracy in this study. Limitations as a result of this decision and potential future research are discussed in Chapter 7.

5.5 Instrument Testing and Pilot Data Capture

Many of the instruments selected for this study were chosen because of their proven track record in earlier research. This approach was taken to reduce the risk of instrument failure and to reduce the requirement to test the instruments with representative samples of project managers. However the individual project

management competence instrument although of a similar format was using a new and as yet untested standard which necessitated that the instrument be tested. Another concern raised by the researcher was the lack of previous research into the link between project management and coping strategy assessment to inform the hypotheses. A preliminary data capture and analysis was conducted to provide guidance on the likelihood of the hypotheses being meaningful. The instruments were incorporated into a wider study of project manager behaviour and competence being conducted by the researcher for other research purposes. Only the instruments relative to this study are reported on in this section. The other questions in the full survey were not considered to have a material effect on the testing nor the validity of the instruments being trialled. The preliminary study received human research ethics approval from the University of Technology, Sydney, through which the instrument testing was conducted. The process and results of the instrument testing are described in this section.

5.5.1 Participants

Subjects for the preliminary study included experienced project managers (N = 71) from ten organisations that agreed to participate in the study by providing up to twenty project managers to complete the survey. The sample included 50 males (70%) and 21 females (30%). The median age bracket was 41-50 years old. The mean number of years of project experience was 9.89 and the mean number of total work experience years was 19.81. The sample was geographically dispersed: 34% from Australia, 14% from New Zealand, 13% from Singapore, 11% from the United Kingdom, 8% from China, 7% from Europe and 7% from the combined group of Malaysia/Thailand/Vietnam, 4% from India and 1% from the United States of America. The recruitment method and sample demographics are comparable to that of the full sample used in this thesis.

5.5.2 Instruments

The instruments tested in this preliminary study include,

1. Project Environment Questionnaire
    - Demographics of the project manager
        - Name
        - Current Role

        - Gender
        - Age
        - Country of residence
    - Number of years project Experience
    - Perceived organisational project management maturity
    - Type of projects being managed
    - Complexity of the projects being managed
2. Individual Project Management Competency
3. Coping Process Assessment
    - Primary Appraisal
    - Coping Strategy Selection

a. Project Environment Questionnaire

The questions include

- Age
    a. under 30
    b. 30-40
    c. 41-50
    d. over 50

- Gender
    1. Male
    2. Female

- In which country do you work?
- How many years project experience do you have?
- How many year work experience do you have?
- What is the perceived level of project management maturity of your organisation
    1. Initial Level - ad hoc and chaotic; relies on the competence of individuals not the organisation's
    2. Repeatable Level - there is a project management system and plans are based on previous experience

3. Defined Level - common, organisation wide understanding of project management activities, roles and responsibilities
4. Managed Level - stable and measured processes against organisational goals; variations are identified and addressed
5. Optimising Level - the entire organisation is focused on continuous improvement

b. Individual Project Management Competence Instrument

The GAPPS based individual project management competence instrument was included in a study being conducted by Crawford and Aitken as a follow up to the earlier research conducted by Crawford (2000b) using the Australian National Competency Standards for Project Management. In the pilot study an alternative process and scale were trialled. Participants were asked to describe a single project they had managed within the past three (3) years. Participants rated the project against the CIFTER factors and were told whether their project was *below Global Level 1, a Global Level 1 project or a Global Level 2 project.* They were then asked to rate each of the performance criteria in the GAPPS standard using the following scale:

1 - I have **never done** this or have only contributed to this being done as part of a team under supervision.
2 - I have done this occasionally on **minimally complex (G1)** projects.
3 - I have done this often on **minimally complex (G1)** projects.
4 - I have done this occasionally on **complex (G2)** projects.
5 - I have done this on many **complex (G2)** projects.

The results of the trial proved the scale to be unusable for statistical analysis as it was not a graded scale. This scale was abandoned and the original used by Crawford, with minor changes, was selected. This scale is documented in section 5.4.2.

Complexity was measured using the CIFTER from the GAPPS project manager standard. The seven (7) items were rated on a four (4) point scale using the descriptors in the table below.

Table 17 - CIFTER Factors

Project Management Complexity Factor	***Descriptor and Points***			
1. Stability of the overall project context	Very high (1)	High (2)	Moderate (3)	Low (4)
2. Number of distinct disciplines, methods, or approaches involved in performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
3. Magnitude of legal, social, or environmental implications from performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
4. Overall expected financial impact (positive or negative) on the project's stakeholders	Low (1)	Moderate (2)	High (3)	Very high (4)
5. Strategic importance of the project to the organisation or organisations involved	Very low (1)	Low (2)	Moderate (3)	High (4)
6. Stakeholder cohesion regarding the characteristics of the product of the project	High (1)	Moderate (2)	Low (3)	Very low (4)
7. Number and variety of interfaces between the project and other organisational entities	Very low (1)	Low (2)	Moderate (3)	High (4)

The data collected from the CIFTER was analysed and the Cronbach alpha for the seven (7) item instrument is .655 acceptable by some standards but below the .7 recommended by Nunnally (1978). Exclusion of item 6, *Stakeholder cohesion regarding the characteristics of the product of the project*, increased the Cronbach alpha score to .701 (N=72).

A factor analysis was conducted to further explore the factor structure of the CIFTER. The CIFTER is designed to measure a single item, complexity. Factor analysis is used to confirm. Inspection of the correlation matrix identified a number of coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.719, exceeding the

recommended value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed two (2) factors with eigenvalues greater than 1 explaining, 37.142 and 21.054% of the variance respectively. The two (2) factor model explained 58.197% of the overall variance. However, from further inspection of the Scree Plot a clear break was evident after the first factor. A second factor analysis was performed on the basis of a one-factor model. The single factor solution revealed a simple structure with all items except item 6 loading onto the one factor. The full analysis is detailed in the Appendix below Section 12.1.7.

c. Coping Instruments

Appraisal of Controllability was measured using a single item taken from the study Folkman et al. (1986) conducted examining the relationship between cognitive appraisal (primary & secondary), coping processes and short term outcomes with stressful situations The question asked subjects to rate how they usually felt when considering stressful situations where

1. 'you can change or do something about the event'
2. 'you have to accept the event'
3. ' you needed to know more before you can act'
4. 'you have to hold yourself back from doing what you want to do'

Coping Strategies were assessed using the dispositional format of the Brief COPE measuring how subjects usually try to deal with stressful situations. The Brief COPE is a 28-item assessment that measures 14 coping scales including, Self Distraction, Active Coping, Denial, Substance Use, Emotional Support, Instrumental Support, Behavioural Disengagement, Venting, Positive Reframing, Planning, Humour, Acceptance, Religion and Self Blame. Subjects were asked to rate to what extent they usually used each of the coping strategies listed on a 4-point scale which is

1. 'I don't usually do this at all';
2. 'I usually do this a little bit';
3. 'I usually do this a medium amount' and
4. 'I usually do this a lot'.

The Cronbach Alpha score is acceptable for this sample (.6631). Internal reliability was explored for each scale. For the scales, Emotional Support, Instrumental Support, Behavioural Disengagement, Venting, Positive, Reframing, Planning, Humour, Religion and Self Blame high internal consistency scores were found ranging from .6827 to .9166. Cronbach Alpha's for Active Coping, Denial and Substance Use were below .6 but remained above .5, the minimum acceptable level (Carver, 1997). However the scales Self Distraction and Acceptance returned unacceptably low scores of .3360 and .4615. These scores are similar to those found by other researchers (Carver, 1997, Fillion et al., 2002).

5.5.3 Summary

The demographic questions were refined following the analysis of the testing results. The combination of questions regarding project and work experience did not provide any useful data and were re-worded for the final study to focus more narrowly on the project experience only. This was split into two questions focusing on number of years project management experience and specifically number of years project manager experience. The question regarding project management maturity was re-worded to reduce the number of words (and time to read and respond) without materially altering the question.

The scale used in the individual competency assessment during the pilot was in fact a nominal scale which resulted in a categorical set of data which was unusable for correlation and regression analysis. The scale was revised for the final data capture to create an ordinal scale and in doing so the number of projects candidates were asked to describe and rate using the scale increased from one (1) to two (2). The CIFTER was determined to be suitable for inclusion within the final study even though the analysis of internal reliability and factor structure provided some doubt as to the strength and accuracy of item 6.

The results of the control rating proved to be unusable, as with the individual competency scale, the control rating was also not a scale. It also became clear that the question of controllability in isolation did not address in enough detail the multiple stages of appraisal contained within the Transactional Theory of Coping (Lazarus and Folkman, 1984b). The hypotheses in this study deal specifically with both primary

and secondary appraisal and the influence of control at both stages. The final study altered the scale used with this question to a 5 point Likert scale and added a second question specifically related to the primary appraisal of threat/challenge. For secondary appraisal an entirely new instrument, Generalised Self Efficacy, was added to explore the nature of control at this juncture in the coping process.

The instrument testing proved the Brief COPE to be applicable and relatively robust with a project manager population and suitable for inclusion in the final study. The low internal reliability scores for two of the scales is considered to be more likely due to the small sample size and the use of the instrument in a dispositional format rather than a fundamental flaw. The instrument was converted to the situational format for the full study.

5.6 Data Handling

The final set of questions was transformed into a web-based questionnaire. The online survey was protected from unsolicited entries by a username and password system. Each participating organisation was given a corporate ID to unlock the online survey and allow individuals to register. Responses were stored in a SQL database held on a secure third party server. Within the database identifying data was stored in separate tables to question response data.

During the 6-months of data capture the survey data was accessed to create confidential individual reports for each respondent using Crystal Reports. This software connects directly with the online database ensuring no copies of identifiable data remained on the researcher's computer. This process required temporary access to identifying information including, company, name and email address. Reports were emailed to respondents. Copies of reports and emails were deleted.

The final data set for analysis was downloaded directly to SPSS V15 Graduate Student Version using an ODBC connection by the researcher. No one other than the researcher has access to the data. No identifying data was downloaded in the process. Individual responses were coded within the database with Candidate, Test and Login

ID numbers, these IDs were downloaded into SPSS to allow data to be checked for duplicate respondents.

5.7 Research Ethics

Human research ethics was applied for and obtained from the Bond University Human Research Ethics Committee (BUHREC). Ethics approval was obtained on the 17 June 2008, protocol number RO0675.

Due to the sensitive nature of the data and the potential implications for the ongoing employment of the participants should the data be exposed to their employers a number of consent forms were required to be agreed to and signed including

- Organisational Consent Form
    - A physical signature was required by an authorized representative of the participating organisation and witnessed
    - Copies of the signed forms are stored in a locked office
- Individual Consent Form
    - An electronic agreement to the consent form is required before the survey can be viewed and completed

Only a single copy of identifiable data is kept on secure third party server. One copy of de-identified data is stored on the researcher's computer for analysis purposes.

5.8 Reliability and Validity

Reliability and validity issues have been discussed at length in the preceding chapters. Due to the cross industry nature of this study and the number of instruments being used it was decided that only pre-existing instruments with proven validity and reliability would be included in the study. This decision combined with the instrument testing conducted ensures that the instruments and the data collected are reliable and valid.

The most significant risk to the reliability and validity of the research design is the self-assessment nature of all the instruments used. It is possible for misinterpretation to occur or even fabrication of answers. The use of existing and well used tools that

have been applied with a variety of different samples is one attempt to reduce the risk of misinterpretation. The risk of fabrication of answers was deemed to be most likely in situations where risk of exposure to others and resultant impacts on job prospects (both positive and negative) in particular should an employer view the results. To mitigate this risk the study included three (3) strategies, the first being to guarantee complete confidentiality of results from all except the researcher. Secondly, participation was entirely voluntary and finally each respondent was offered a confidential suggested development report based on their survey results thus encouraging accuracy of response to increase the usefulness of the report.

5.9 Approach to Analysis

The data analysis includes univariate, confirmatory and exploratory analysis:

a. Univariate Analysis

Univariate analysis is the analysis of a single variable at a time. This study will analyse frequencies, means and other descriptive statistics for the data captured.

b. Confirmatory Analysis

The analysis of data for confirmation of hypotheses will make use of both bivariate techniques, including Pearson correlations and regression analysis, and ANOVA, including one-way repeated measures and between group ANOVA. The only exception is H01 which will be analysed using univariate analysis, specifically frequency analysis.

Bivariate Analysis

Bivariate analysis, the simultaneous analysis of two (2) variables is used when testing hypotheses of association (Pearson Correlation) and causality (regression analysis).

Pearson Correlation

Correlation analysis is used to describe the strength and direction of the linear relationship between two variables. There are a number of potential correlation statistics available; this study will use the Pearson product moment correlation.

(H05)

Variable 1: CSW05, CSH05, CSP05

Variable 2: CSW06, CSH06, CSP06

(H07)

Variable 1: GSESUM

Variable 2: Brief COPE scores

(H10, H11)

Project management culture is measured through a series of proxy measures rather than directly as a single concept in this study. As discussed above in Section 2.1 culture is the collective representation of individual thoughts, actions and beliefs. It is in itself a composite construct. The proxy measures include a longitudinal measure of number of years exposure to the field of project management, number of years exposure to the role of project manager, the perceived level organisational project management capability and a measure of direct application of project management skills to current work.

Variable 1: Project Management Culture (PEQ07, PEQ08, PEQ09, CQSUM, CQ1-6)

Variable 2: Brief COPE scores (work, home, personal health)

(H14)

Variable 1: Project Management Culture (PEQ07, PEQ08, PEQ09, CQSUM, CQ1-6)

Variable 2: GSESUM

Regression Analysis

(H12)

Dependent Variable: Brief COPE scores (work, home, personal health)

Independent Variables: Project Management Culture (PEQ07, PEQ08, PEQ09, CQSUM, CQ1-6), GSESUM

(H08, H09)

Dependent Variable: Brief COPE scores (work, home, personal health)

Independent Variables: Perceived Control (CSW05, CSH05, CSP05), Challenge/Threat Appraisal (CSW06, CSH06, CSP06), GSESUM

(H13)
Dependent Variable: Perceived Control (CSW05, CSH05, CSP05), Challenge/Threat Appraisal (CSW06, CSH06, CSP06)
Independent Variables: Project Management Culture (PEQ07, PEQ08, PEQ09, CQSUM, CQ1-6), GSESUM

ANOVA

One-Way Repeated Measure ANOVA
(H02)
Independent Variable: Domain (work, home, personal health)
Dependent Variable: Brief COPE scores

(H03)
Independent Variable: Domain (work, home, personal health)
Dependent Variable: Appraisal of control (CSW05, CSH05 and CSP05)

(H04)
Independent Variable: Domain (work, home, personal health)
Dependent Variable: Appraisal of control (CSW06, CSH06 and CSP06)

T-Test
(H06)
Independent Variable: Group 1: Project Manager, Group 2: Global
Dependent Variable: GSESUM

c. Exploratory Analysis

Finally exploratory analysis was conducted to examine the potential relationship between stressfulness ratings for overall stress and for specific stressful events and coping strategy selection. This analysis has been classified as exploratory as there are no predefined hypotheses derived from the theoretical framework being applied in this

study for these potential relationships. The primary theoretical framework used in this study is that of the Transactional Theory of Coping which views each stressful event as cognitive process of appraisal of coping resources and strategy selection that is primarily influenced by the perceived control an individual has over the situation and the adequacy of the coping resources available to them. There is no measure for how stressful an event is perceived to be within this framework and how this may influence the coping strategy selection. Additionally the exploratory analysis will examine the relationship between overall stress ratings (how stressed respondents report being in general) and the individual stressfulness ratings of specific stressors.

6 ANALYSIS

The data analysed in this section has been collected according to the processes outlined in Chapter 5. Two additional data sets are used within this section, the first being the sample collected as part of instrument testing as described in section 5.5, and the second being the world_24nations_25nov2006 data set for general self-efficacy obtained from the author of the GSE instrument (Schwartzer, 2006). The analysis will follow the pattern outlined in section 5.9 with descriptive statistics provided for each data set followed by the confirmatory analysis for each of the hypotheses being tested in this study. Finally exploratory analysis looks at how stressfulness ratings relate to coping strategy selection for project managers.

6.1 Univariate Analysis - Descriptive Statistics

6.1.1 Project Environment

j. Current Role

The final sample contained 62.5% self nominated project managers. Only 6.9% rated themselves as operating at below the level of a project manager. Table 18 and Figure 14 below include the specific statistics.

Table 18 - PEQ03 Role Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 – Team Member	15	6.9	6.9	6.9
	2 – Project Manager	135	62.5	62.5	69.4
	3 – Project Director	21	9.7	9.7	79.2
	4 – Program Manager	45	20.8	20.8	100.0
	Total	216	100.0	100.0	

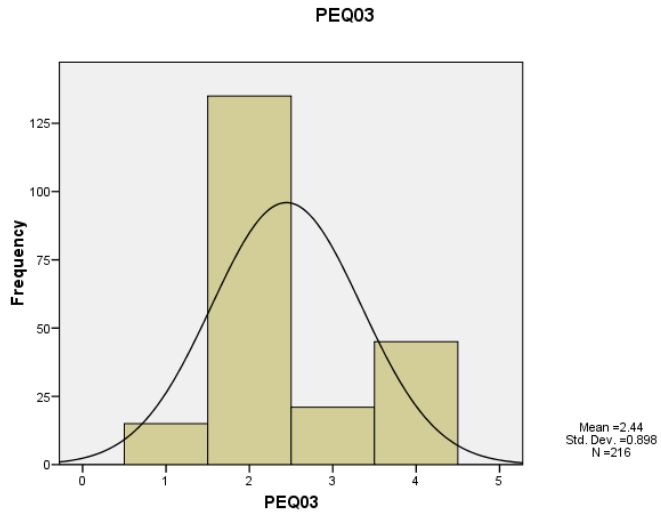

Figure 14 - Role Distribution (PEQ03)

k. Gender

The gender distribution is skewed towards a male sample with 69.9% of the sample being male and 30.1% female. This distribution is indicative of the project management industry which is traditionally male dominated having originated in the construction, engineering and defence industries. These results are consistent with previous studies (Crawford, 2000b, Aitken and Crawford, 2006, Aitken and Crawford, 2008).

Table 19 - PEQ04 Gender Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	65	30.1	30.1	30.1
	M	151	69.9	69.9	100.0
	Total	216	100.0	100.0	

l. Age

The final sample contains no data from respondents under the age of 25 years. The majority of respondents (56%) are between the ages of 41-55 years with over 80% of respondents being between the ages of 31 and 55 years of age. Full age distributions are shown in Table 20 below.

Table 20 - PEQ05 Aged Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 – 25-30yrs	15	6.9	6.9	6.9
	3 – 31 – 40 yrs	55	25.5	25.5	32.4
	4 – 41 – 55 yrs	121	56.0	56.0	88.4
	5 – > 50yrs	25	11.6	11.6	100.0
	Total	216	100.0	100.0	

As can be seen from Figure 15 below the mean reported age bracket is 3.72 out of a possible 5, with a standard deviation of only 0.757 making the average age for the group between 31 and 40 years.

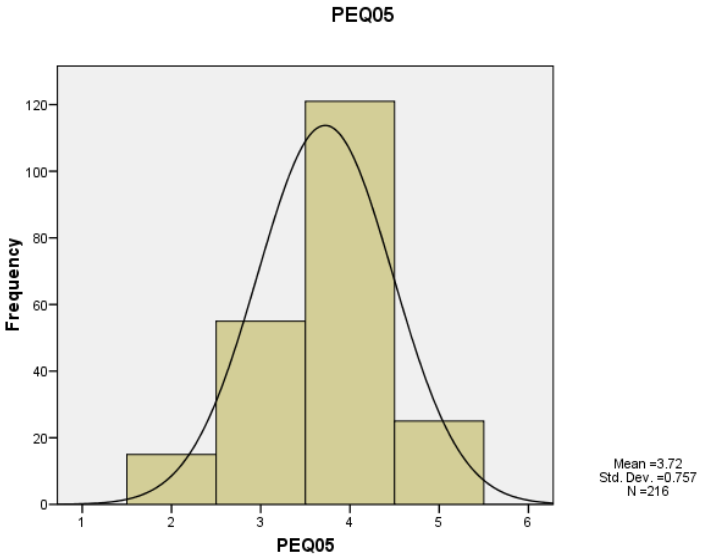

Figure 15 - Age Distribution (PEQ05)

m. Primary Country of Work

Australia dominates the sample with 63.4% of the sample nominating Australia as their primary country of work. Great Britain provided 10.6% of the sample Singapore 9.3%, South Africa 5.6% and North America 7.4%. The heavy skew towards Australia will limit the generalisability across different cultures. However, the Australian, NZ, British, North America results make up a total of 81.9% of the sample thus providing the possibility of generalisability of the results across developed western nation populations. The full distribution results are shown in Table 21 below.

Table 21 - PEQ06 Country Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AE	1	.5	.5	.5
	AU	137	63.4	63.4	63.9
	CA	11	5.1	5.1	69.0
	GB	23	10.6	10.6	79.6
	ID	1	.5	.5	80.1
	IN	1	.5	.5	80.6
	NA	1	.5	.5	81.0
	NZ	1	.5	.5	81.5
	SD	1	.5	.5	81.9
	SG	20	9.3	9.3	91.2
	SK	1	.5	.5	91.7
	US	5	2.3	2.3	94.0
	VN	1	.5	.5	94.4
	ZA	12	5.6	5.6	100.0
	Total	216	100.0	100.0	

n. Number of Years Project Management and Project Manager Experience

The table below shows the full sample contained N=214 valid responses; the number of years project manager experience was on average 3 years less than the total number of years project management experience. The standard deviation was very high for both measures with 8.184 and 7.436 years respectively. Thus the sample has a wide range of number of years experience within it. And the ranges were 1 to 45 years and 0 to 30 years. Overall the number of years experience is varied and no clear patterns are immediately observable.

Table 22 - PEQ07 & PEQ08 Project Management Experience

		PEQ07	PEQ08
N	Valid	214	214
	Missing	2	2
Mean		12.93	9.90
Std. Deviation		8.184	7.436
Minimum		1	0
Maximum		45	30

o. Organisational Project Management Maturity

The mean score for the sample is 2.99 out of a possible 5, indicating an average competence of "Defined, Organisation Wide PM System". The normal curve is situated relatively evenly across the 5-point scale with standard deviation being

moderately high at 1.189. Figure 16 below shows the frequency distributions. These results are slightly lower than those collected by Aitken & Crawford (2008) in their study on senior management perceptions of effective project manager behaviours which reported slightly higher perceptions of 3.46. These results are similar to findings (Aitken and Crawford, 2006) from the preliminary data capture for this study in relation to dispositional coping strategies of project managers which found the mean to be 3 with a general skew towards 4. The results in this study are more closely aligned with those found by Crawford (2000b) who reported an average of 2.9 with a standard deviation of 1.08 in her study into project manager competence. The differences are slight and may be explained by the variation in sample sizes. The two (2) samples reporting higher maturity levels were collected from relatively small samples (N=41 to 71) whereas both this study and Crawford's (2000b) study contain far great numbers of individuals and number of organisations represented with samples of N=216 and N=333 respectively.

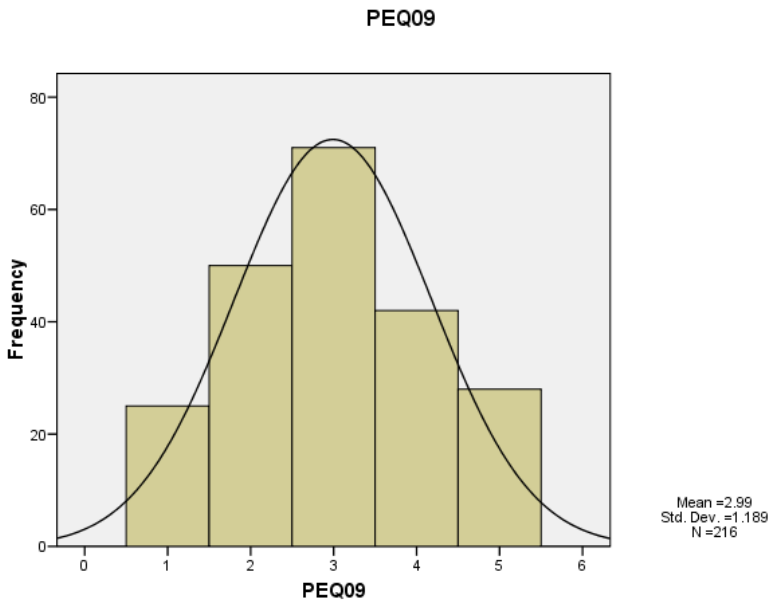

Figure 16 - Organisational Maturity (PEQ09)

p. Industry

The distribution across industries was relatively even with figures approximating those anticipated in the research design with no one industry dominating the sample. The major deviation from the research design is the expected 25% of the sample coming from Business Services. Business Services only provided 4.2% of the sample.

This deviation from expectation is explained by the change to the final survey question to extract Finance out as a specific option rather than group it within Business Service. The combined total of Business Services and Finance is 22.7% of the total sample. Engineering and Construction provided the most respondents with 26.9% and IT & Telecommunications provided 19.4%. Overall the results are evenly enough spread to provide generalisability of the results across industry.

Table 23 - PEQ10 Industry Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 – E&C	58	26.9	26.9	26.9
	2 – BS	9	4.2	4.2	31.0
	3 – IT&T	42	19.4	19.4	50.5
	4 – Finance	40	18.5	18.5	69.0
	5 – Manufacturing	11	5.1	5.1	74.1
	6 - Other	56	25.9	25.9	100.0
	Total	216	100.0	100.0	

q. Organisation Type

The research design anticipated that 25% of the sample would be public sector with the remaining 75% of the sample being spread across a range of private sector organisations. The final sample contains 17.1% public sector project managers. The relative weighting of the sample and the small absolute number of public sector respondents will result in the generalisability of the research being more readily applied to the private sector than the public. Table 24 below includes the distribution figures by sector.

Table 24 - PEQ11 Sector Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 – Private	179	82.9	82.9	82.9
	2 - Public	37	17.1	17.1	100.0
	Total	216	100.0	100.0	

r. Project Type

The research design did not include an anticipated division of internally and externally run projects, see table 25 below. The final sample includes a relatively even split between the two with 58.8% of the sample typically managing internal (to the organisation) projects and 41.2% running projects for clients external to the

organisation. The results of this study are likely to be generalisable across these aspects of project type.

Table 25 - PEQ12 Project Type Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 – internal	127	58.8	58.8	58.8
	2 – external	89	41.2	41.2	100.0
	Total	216	100.0	100.0	

6.1.2 Individual Project Management Competency

Individual project management competence was measured using the GAPPS project manager standard which contains six (6) sub-scales. Table 26 below contains the descriptive statistics for the overall individual project management competence score CQSUM and each individual sub-scale. The mean score for CQSUM is 21.8079 out of a possible 36. The mean scores across each of the sub-scales is relatively consistent ranging from 3.2836 to 3.8937. Scores between 3 and 4 are representative of the full application of project management competencies in the role of project manager.

Table 26 - CQ Unit Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CQSUM	215	10.01	29.27	21.8079	4.02704
CQ1	215	1.29	4.79	3.6213	.68788
CQ2	215	1.83	5.00	3.6778	.67123
CQ3	215	1.80	5.00	3.7093	.69746
CQ4	215	1.00	5.00	3.8937	.81040
CQ5	215	1.00	5.00	3.6233	.80631
CQ6	216	1.00	5.00	3.2836	1.05965
Valid N (listwise)	215				

The distribution of scores across the six (6) units is shown in the histograms below. There are definite peaks found in Managing Product Acceptance and for Managing Project Transitions. There is a relatively even distribution across the scales for each of the remaining four (4) units.

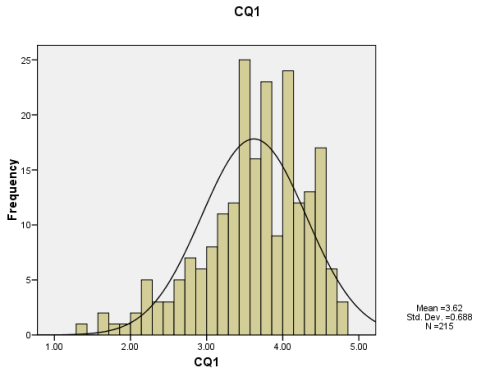

Figure 17 - Manage Stakeholder Relationships (CQ1)

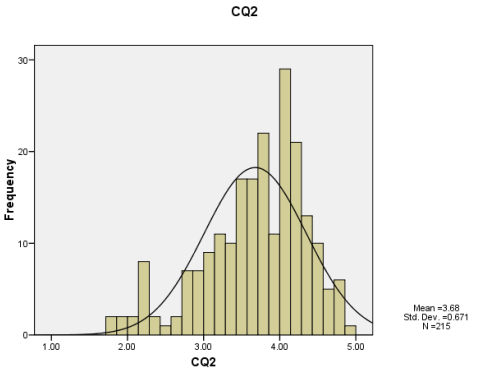

Figure 18 - Manage Development of the Plan for the Project (CQ2)

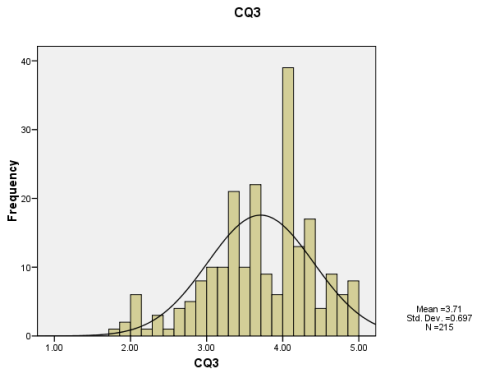

Figure 19 - Manage Project Progress (CQ3)

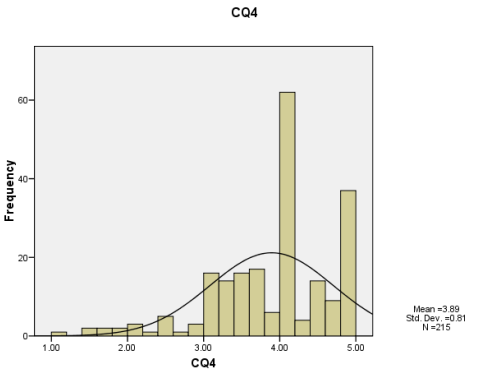

Figure 20 - Manage Product Acceptance (CQ4)

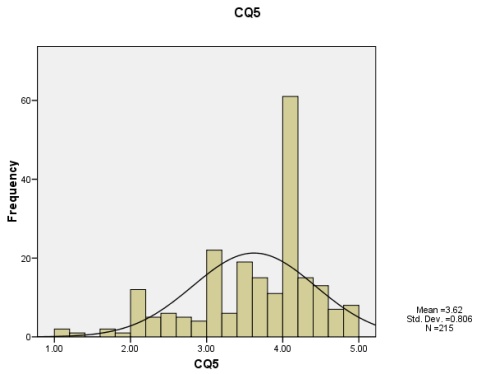

Figure 21 - Manage Project Transitions (CQ5)

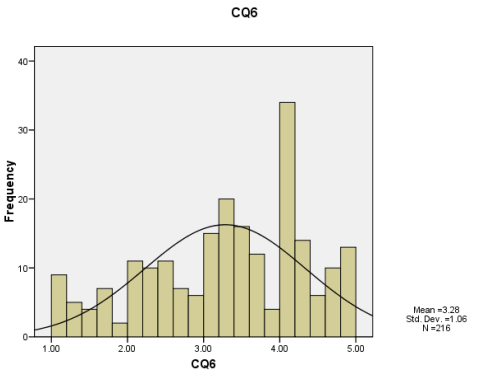

Figure 22 - Evaluate and Improve Project Performance (CQ6)

6.1.3 Nature of the Stressful Event

a. Stressfulness of the Event

Work-based stressors were consistently reported as more stressful than either home or personal health issues with a mean of 80.76 and a standard deviation of 17.269 relative to a mean of 69.78 for home-based stressors and even lower 58.99 for personal health. Both home and personal health stressors reported a much higher standard deviation of 27.53 and 28.856 respectively demonstrating a much greater variation in the potential impacts by home and personal health stressors. This may be due to a wider range of potential stressors at home and with our health than are likely to occur within the bounds of work. It should be noted that the response rate for the personal health stressors was much lower than for the home and work-based stressors with a total N=183. This is due primarily to the fact that this section was optional in the survey based on feedback received that it would be highly likely for respondents to have had no stressors related to personal health within a 12 month period. The histograms below show the distribution of stressfulness ratings across all three domains.

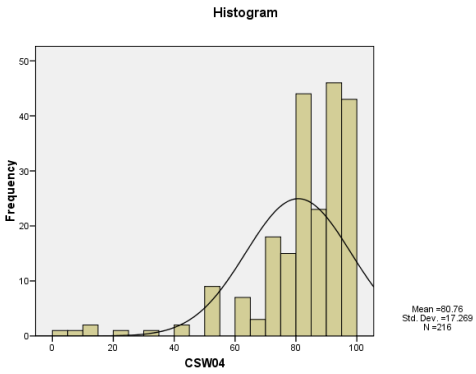

Figure 23 - Stressfulness of Reported Work Events

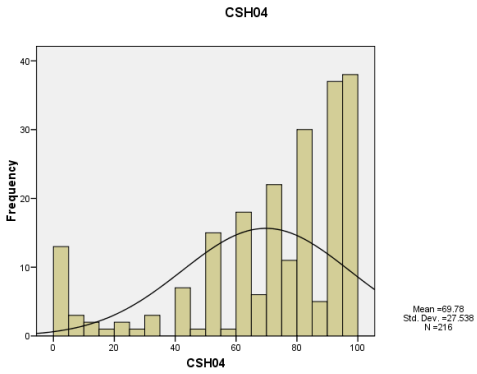

Figure 24 - Stressfulness of Reported Home Events

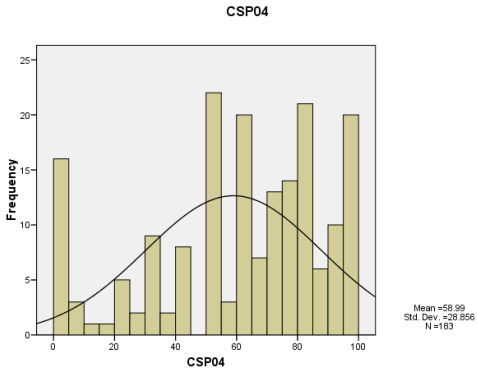

Figure 25 - Stressfulness of Reported Personal Health Events

b. Anticipated Problem or Situation

Personal Health stressors were reported as less anticipated, that is they were a surprise, than either work or home-based stressors which both reported relatively even levels of anticipation across the sample. The mean for personal health stressors was 2.44 relative to 2.78 for work-based stressors and 2.9 for home-based stressors. The histograms below detail the spread of reported anticipation levels across the three domains.

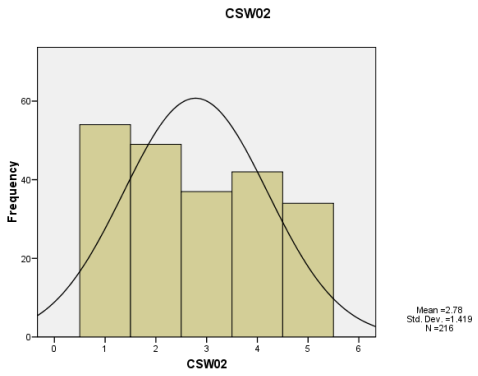

Figure 26 - Level of Anticipation of Reported Work Events

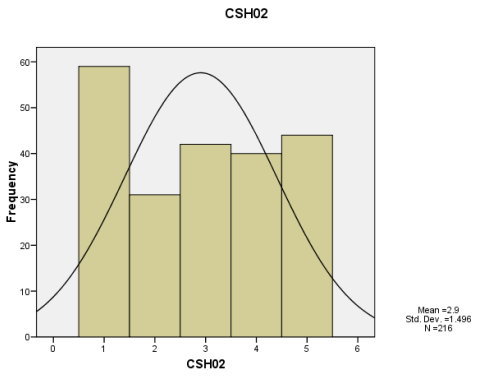

Figure 27 - Level of Anticipation of Reported Home Events

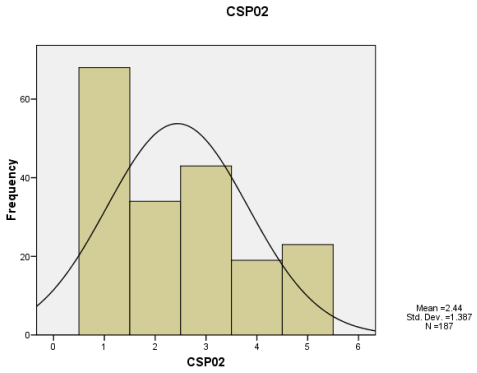

Figure 28 - Level of Anticipation of Reported Personal Health Events

c. Single Event or Chronic Situation

Work-based stressors were reported as being single events more often than home or personal health stressors. Single events made up 60.65% of all work-based stressors compared with only 43.48% of home-based stressors and 42.59% of personal health stressors. The pie charts below detail the relative proportions for each domain of single and chronic events. As with the level of stressfulness associated with event the pattern of single and chronic events is similar for both home and personal health

stressors and different for work-based stressors. In the diagrams below 0 = Chronic Stressful Event and 1 = Single Stressful Event

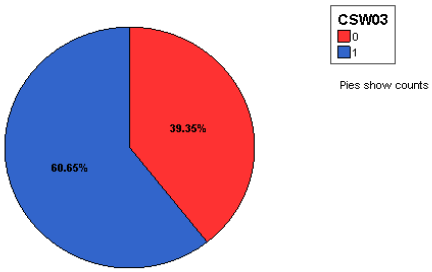

Figure 29 - Nature of Reported Work Events

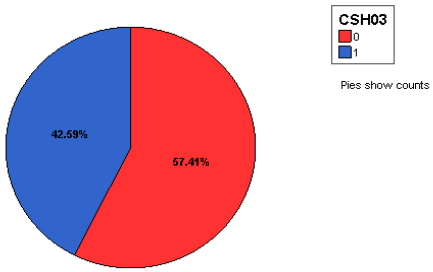

Figure 30 - Nature of Reported Home Events

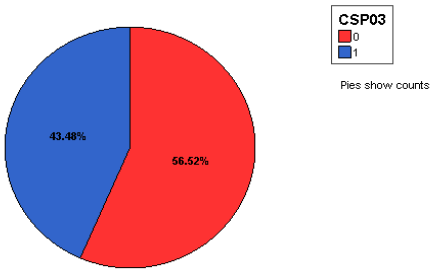

Figure 31 - Nature of Reported Personal Health Events

d. Perceived Control of Specific Situations

The sample size for perceived control over the specific stressful situations described by respondents is work (N=216), home (N=216) and personal health (N=186) stressors. Table 27 contains descriptive data for this question. The means across all three (3) domains of work, home and personal health are very similar although the distributions differed between the work-based stressors and home and personal health which display more similar patterns of distribution. Distributions are shown in the histograms below, Figures 32-43. The means are 2.51 for work stressors, 2.58 for home-based stressors and 2.61 for personal health stressors.

Table 27 - Descriptive Statistics - Perceived Control Appraisal

		CSW06	CSH06	CSP06
N	Valid	216	216	186
	Missing	0	0	30
Std. Deviation		1.208	1.309	1.395
Variance		1.460	1.715	1.945
Minimum		1	1	1
Maximum		5	5	5

Although these results in themselves do not provide conclusive evidence to support any of the hypotheses in this study it is interesting to note that the means although consistent across the domains (in line with the hypotheses that project managers will feel in control and cope with stress in the same way across all three domains), are much lower than expected. Means below 3 indicate an average tendency for project managers to rate specific stressful events as less controllable which according to previous research (Folkman and Lazarus, 1980) makes them less likely to use problem-focused coping strategies. The frequencies for each domain can be found in Table 28 below. Participants rated each stressful event described on a five (5) point scale where one (1) was described as 'completely unchangeable I just had to accept it' through to five (5) described as 'completely within my control to change the situation'.

Table 28 - Frequency Statistics - Perceived Control Appraisal

		CSW06 Frequency	**CSH06** Frequency	**CSP06** Frequency
Valid	1	54	61	57
	2	61	45	32
	3	51	55	48
	4	37	34	23
	5	13	21	26
	Total	216	216	186

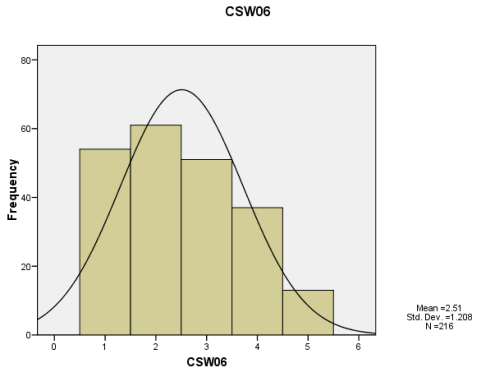

Figure 32 - Perceived Control Appraisal of Work-based Stressors (CSW06)

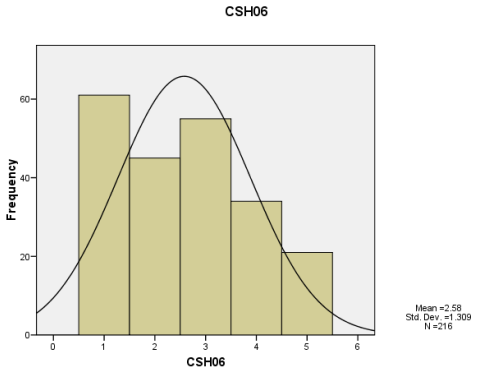

Figure 33 - Perceived Control Appraisal of Home-based Stressors (CSH06)

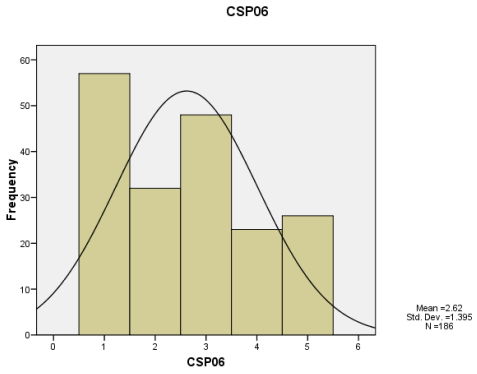

Figure 34 - Perceived Control Appraisal of Personal Health Stressors (CSP06)

e. Challenge/Threat Appraisal

The final sample for the challenge threat appraisals for specific stressful events are show in Table 29 below. The results show relatively low mean scores with 3.12 (out of a possible 5) for work-based stressors indicating a slight tendency for these stressors to be rated as challenges rather than threats. The mean for home-based stressors is 2.89 and even lower, 2.51, for personal health stressors. The standard deviations are relatively consistent across the samples and are moderately high indicating a moderately high degree of volatility in the scores. The frequencies are documented in Table 30 below and the distributions are documented in the histograms below, Figures 35-37. These results indicate that hypothesis H03, that project managers will appraise stressful situations as "challenges" rather than "threats" across all three domains of work, home and personal health is false. This is explored in more detail in subsequent sections of this thesis.

Table 29 - Descriptive Statistics - Challenge/Threat Appraisal

		CSW05	CSH05	CSP05
N	Valid	216	216	185
	Missing	0	0	31
Std. Deviation		1.316	1.318	1.277
Variance		1.731	1.736	1.632
Minimum		1	1	1
Maximum		5	5	5

Table 30 - Frequency Statistics - Challenge/Threat Appraisal

		CSW05 Frequency	**CSH05** Frequency	**CSP05** Frequency
Valid	1	29	43	52
	2	50	39	43
	3	42	65	51
	4	57	37	21
	5	38	32	18
	Total	216	216	185

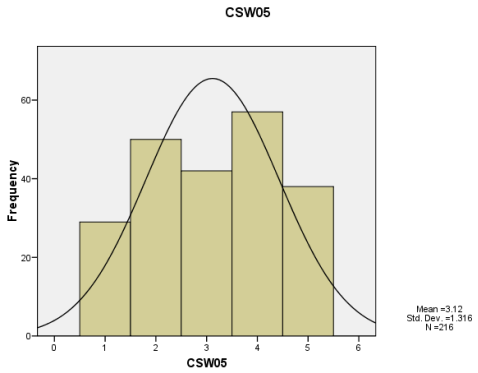

Figure 35 - Challenge/Threat Appraisal of Work-based Stressors (CSW05)

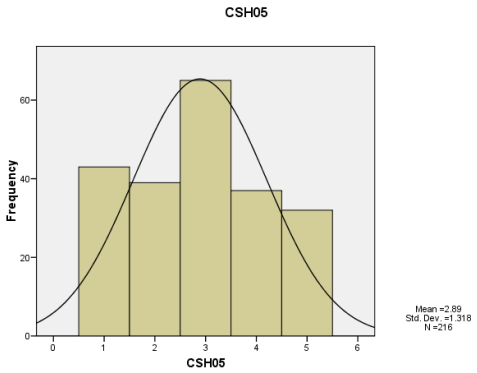

Figure 36 - Challenge/Threat Appraisal of Home-based Stressors (CSH05)

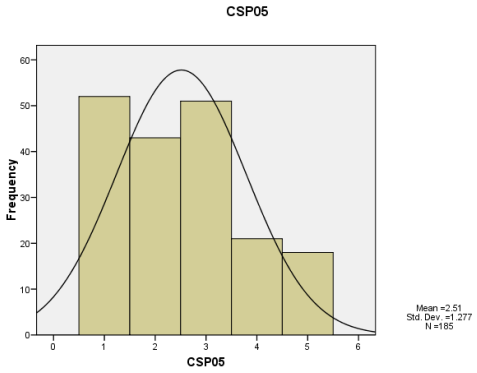

Figure 37 - Challenge/Threat Appraisal of Personal Health Stressors (CSP05)

g. Coping Strategy Selection

The mean scores for each of the fourteen (14) scales of the Brief COPE across each of the three (3) domains of work, home and personal health are documented in Tables 30-32 below. The sample consists of N=215 project managers for work and home and N=186 for personal health. Respondents reported the highest mean scores across all three (3) of the domains for Active Coping, Planning and Acceptance. The means for work-based stressors were higher for all three (3) coping strategies than for home and personal health stressors. Hypothesis H02 predicts that project managers will use more problem focused coping strategies across all three (3) domains than emotion-focused strategies. These results confirm that H02 is true, project managers do use more Active Coping and Planning than all other forms of coping (other than Acceptance for home and personal health stressors which features second on the list) when dealing with stressful situations across all three (3) domains of work, home and personal health. Further analysis is conducted using one-way repeated measure ANOVAs in the following section to explore the depth and significance of the mean differences between the three (3) domains.

Table 31 - Descriptive Statistics Work-based Stressor Coping Strategy Selection

	N	Minimum	Maximum	Mean	Std. Deviation
CSW_AC	215	2.00	8.00	7.0698	1.31837
CSW_P	215	2.00	8.00	7.0558	1.22537
CSW_A	215	2.00	8.00	6.2558	1.53302
CSW_UIS	215	2.00	8.00	5.5628	1.74402
CSW_PR	215	2.00	8.00	5.2791	1.72564
CSW_H	215	2.00	8.00	4.5581	1.84824
CSW_UES	215	2.00	8.00	4.5395	1.74470
CSW_SD	215	2.00	8.00	4.3628	1.62012
CSW_V	215	2.00	8.00	4.2651	1.54963
CSW_SB	215	2.00	8.00	3.2651	1.47548
CSW_R	215	2.00	8.00	3.1767	1.82055
CSW_D	215	2.00	8.00	2.5907	1.11904
CSW_SU	215	2.00	6.00	2.4419	.91973
CSW_BD	215	2.00	7.00	2.4372	.92953
Valid N (listwise)	215				

Table 32 - Descriptive Statistics Home-based Stressor Coping Strategy Selection

	N	Minimum	Maximum	Mean	Std. Deviation
CSH_P	215	2.00	8.00	6.3023	1.78696
CSH_A	215	2.00	8.00	6.1256	1.81583
CSH_AC	215	2.00	8.00	5.9721	1.83404
CSH_PR	215	2.00	8.00	5.0047	2.02669
CSH_UIS	215	2.00	8.00	4.8744	2.06394
CSH_UES	215	2.00	8.00	4.7721	2.06419
CSH_SD	215	2.00	8.00	4.5721	1.91969
CSH_V	215	2.00	8.00	4.0186	1.74806
CSH_H	215	2.00	8.00	3.6093	1.94934
CSH_R	215	2.00	8.00	3.3628	2.04357
CSH_SB	215	2.00	8.00	3.2651	1.65463
CSH_BD	215	2.00	8.00	2.8093	1.28467
CSH_D	215	2.00	8.00	2.7256	1.23578
CSH_SU	215	2.00	8.00	2.6093	1.24402
Valid N (listwise)	215				

Table 33 - Descriptive Statistics Personal Health Stressor Coping Strategy Selection

	N	Minimum	Maximum	Mean	Std. Deviation
CSP_AC	186	2.00	8.00	6.0269	1.94917
CSP_A	186	2.00	8.00	5.8548	1.91026
CSP_P	184	2.00	8.00	5.7283	2.03576
CSP_UIS	186	2.00	8.00	5.2419	2.26860
CSP_UES	186	2.00	8.00	4.7903	1.99028
CSP_SD	187	2.00	8.00	4.2727	1.88242
CSP_PR	186	2.00	8.00	4.0538	2.10207
CSP_H	186	2.00	8.00	3.7742	2.06452
CSP_V	186	2.00	8.00	3.4839	1.60817
CSP_SB	186	2.00	8.00	3.4355	1.87115
CSP_R	186	2.00	8.00	3.0645	1.76945
CSP_SU	185	2.00	8.00	2.6865	1.52482
CSP_D	186	2.00	8.00	2.6613	1.22951
CSP_BD	186	2.00	8.00	2.6237	1.18014
Valid N (listwise)	174				

h. General Self Efficacy

The GSESUM scores are skewed heavily to the upper end of the scale with the mean being 33.86 out of a possible 40. The distribution is shown in the histogram below in Figure 38. This indicates that the project manager population has a very strong sense of their own ability to affect positive outcomes when dealing with stressful situations. This result is inconsistent with the initial findings from the perceived control of specific stressful events which found the mean tending towards uncontrollable. This difference may be explainable by the situational nature of the perceived control

measure and the dispositional nature of the GSE measure. The relationship between the elements of control being explored in this study is examined further in the subsequent sections, specifically in relation to hypothesis H09. GSE and its relationship with coping strategy selection will be examined in relation to hypotheses H06, H07 and H08.

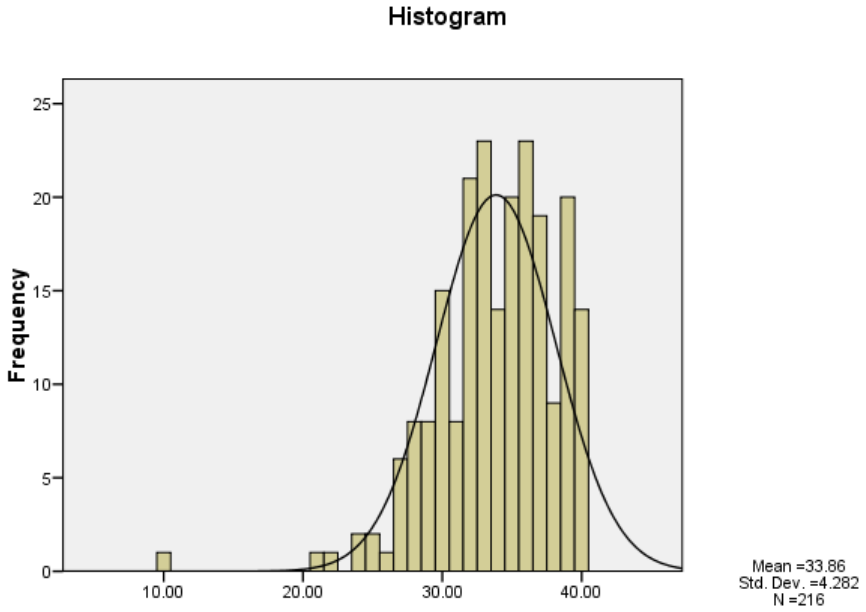

Figure 38 - Distribution GSESUM

An analysis of the means, shown in Table 34 below, for each of the ten (10) items within the GSE instrument reveals a relatively even distribution of results across all ten (10) items. Item GSE02, "If someone opposes me I can find a means and ways to get what I want", reports the lowest mean, the only mean to fall under 3 out of a possible 4.

Table 34 - Descriptive Statistics GSE

	N	Minimum	Maximum	Mean	Std. Deviation
GSE01	216	1	4	3.49	.562
GSE02	216	1	4	2.93	.657
GSE03	216	1	4	3.26	.616
GSE04	216	1	4	3.49	.625
GSE05	216	1	4	3.37	.603
GSE06	216	1	4	3.61	.534
GSE07	216	1	4	3.36	.675
GSE08	216	1	4	3.46	.609
GSE09	216	1	4	3.46	.639
GSE10	216	1	4	3.43	.621
Valid N (listwise)	216				

6.1.4 Univariate Analysis – Pilot Data

Data analysis was conducted on the pilot data to test the questionnaire development for suitability for the analysis techniques to be used in the final data collection and analysis. The key indicator that was being explored was the type of dispositional coping strategy selection to test hypothesis H01 that project managers use more problem focused coping strategies in general than emotion-focused coping strategies. This early indicator was used to shape the full set of hypotheses explored in this study. The results of this pilot data analysis is as follows:

a. Demographics

The demographics for the pilot data are discussed in section 5.5.1 above and will not be repeated in detail here. The demographics for the pilot study as well as the methodology for enlisting participation and capturing data through an on-line survey are similar to those for the full study.

b. Dispositional Coping Strategy Selection

The data set contains N=79 valid responses. The internal consistency and factor analysis of the Brief COPE for this sample are discussed in section 5.5.2 above. H01 states that project managers use more problem-focused coping strategies, specifically active coping and planning, than emotion-focused coping strategies when dealing with stressful situations in general. The Brief COPE was applied in its dispositional format to explore this hypothesis. The findings are documented in Table 35 below. It can be seen clearly that Active coping is the coping strategy reported as being most often used when dealing with stressful situations with a mean of 7.23 out of 8. The range is also very small from 5 to 8. The second most commonly used coping strategy is Planning with a mean of 7.01. These results support the hypothesis (H01) that in general project managers tend to use more Active Coping (CS_AC) and Planning (CS_P) than other forms or coping when dealing with stressful situations. The other forms of coping that can typically be considered problem-focused rather than emotion focused include, Use of Instrumental Support (CS_UI) which featured fourth on the list. The two (2) items that ranked second and third were a full point below on a comparison of means included Positive Reframing (CS_PR) and Acceptance (CS_A).

These were unexpected and are explored in more detail in the confirmatory analysis section below.

Table 35 - Descriptive Statistics Dispositional Coping Strategy Selection

	N	Minimum	Maximum	Mean	Std. Deviation
CS_AC	79	5	8	7.23	.876
CS_P	79	3	8	7.01	1.204
CS_PR	79	2	8	6.05	1.348
CS_A	79	2	8	6.03	1.330
CS_UI	79	2	8	6.03	1.271
CS_UE	79	2	8	4.58	1.598
CS_SD	79	2	8	4.43	1.429
CS_SB	79	2	8	4.25	1.605
CS_V	79	2	8	4.20	1.497
CS_H	79	1	8	4.18	1.534
CS_R	79	2	8	3.54	2.018
CS_D	79	2	6	2.44	.797
CS_BD	79	2	8	2.43	.929
CS_SU	79	2	5	2.32	.760
Valid N (listwise)	79				

6.1.5 Univariate Analysis – World 24 Nation GSE Data

a. Demographics

The data set contains N=15404 valid results for age and N=17216 valid results for sex. There are a further 638 valid results for which age bands have been defined but no single age figure is recorded. The general sample approximates the general population in terms of gender with slightly more females (49.1%) than males (37.4%) shown in Table 36 below.

Table 36 - Demographics World 24 Nation GSE Data

		age	sex
N	Valid	15404	17216
	Missing	4492	2680

Table 37 - Gender Demographics World 24 Nation GSE Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	7449	37.4	43.3	43.3
	female	9767	49.1	56.7	100.0
	Total	17216	86.5	100.0	
Missing	9	2679	13.5		
	System	1	.0		
	Total	2680	13.5		
Total		19896	100.0		

The distribution of age can be seen in the histogram below in Figure 39. The World 24 Nation GSE database is skewed heavily to the less than 25 year age group with nearly two-thirds of the sample coming from children and students. This distribution differs significantly from the age demographics for the sample used for this study. The heavy skew towards a younger demographic is explored in the following section to understand the potential effect on the GSE scores.

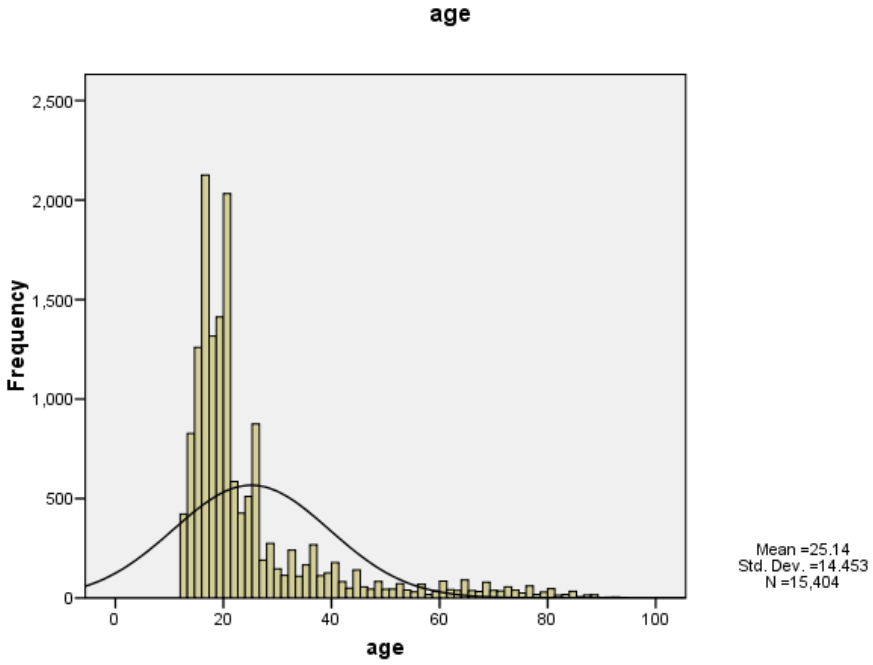

Figure 39 - Age Distribution World 24 Nation Sample

b. GSE

The Sumscore figure is the total of all scores from the 10-items on the GSE instrument. The minimum is 10 through to a maximum of 40. The full global 24

nation sample contains N=19,719 valid responses with a mean of 29.59 and a standard deviation of 5.28. The distribution is shown in the histogram below in Figure 40.

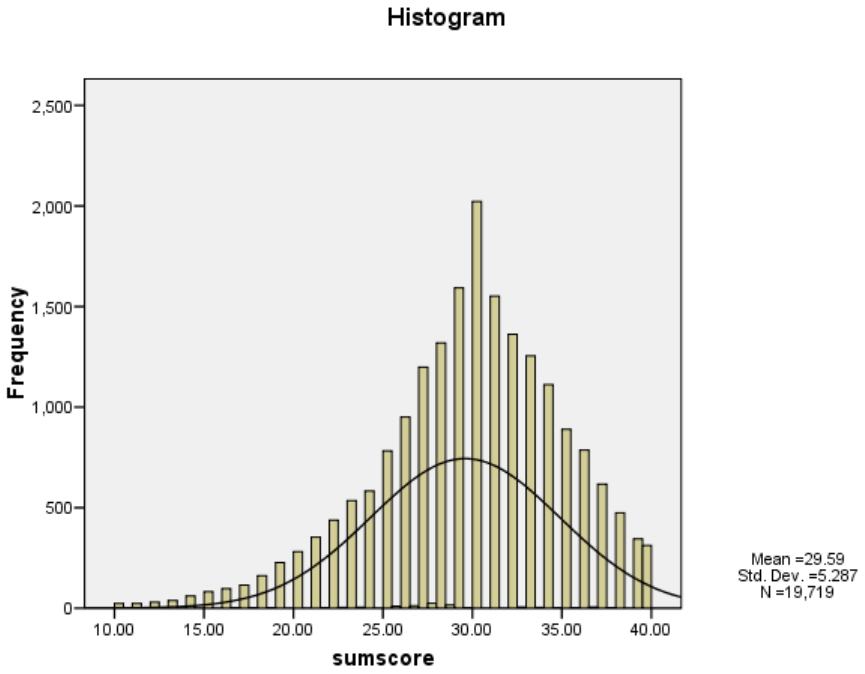

Figure 40 - GSE (Sumscore) World 24 Nation Sample

The analysis of the age distribution in the section above revealed a significant difference in the age distributions between the world 24 nation sample and the sample of project managers for this study. A preliminary analysis of a reduced world 24 nation sample to only those responses with age results over 25 years or age_group_usa_internet results scoring 4 (25-30yrs) and above was conducted. The mean for the Sumscore increased a small amount to 29.78 with a standard deviation of 5.25. The first analysis indicates that the age distribution differences are not materially affecting the GSE scores. Further analysis is conducted and reported in the confirmatory analysis below using independent t-tests.

Table 38 - Descriptive Statistics Over 25 Years World 24 Nation Sample

	N	Minimum	Maximum	Mean	Std. Deviation
Sumscore	5125	10.00	40.00	29.7766	5.24829
age	4487	26	94	42.15	16.967
age_group_usa_internet	682	4.00	13.00	5.7111	1.71377
Valid N (listwise)	0				

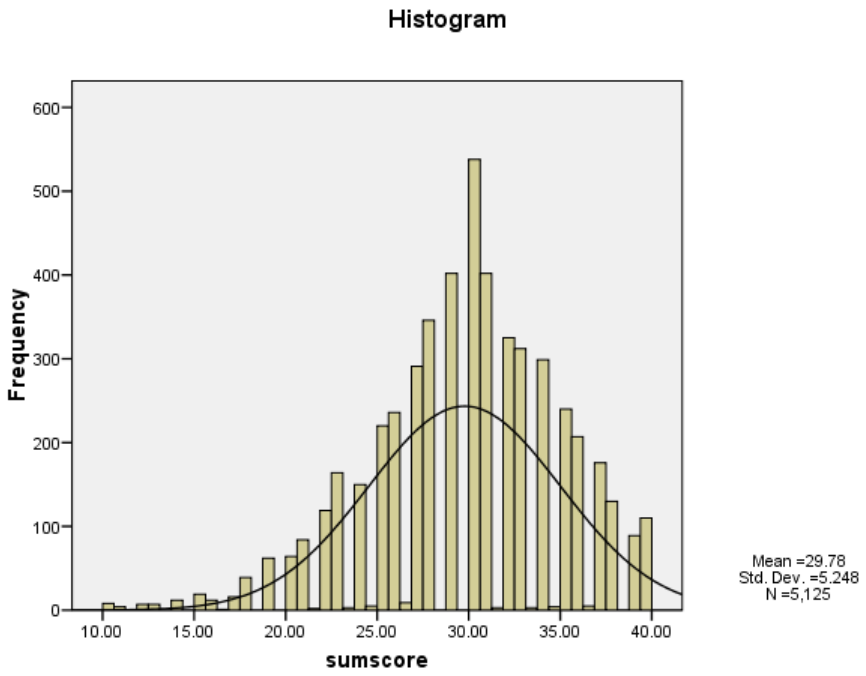

Figure 41 - GSE (Sumscore) Over 25 years World 24 Nation Sample

6.2 Bivariate Analysis

6.2.1 Primary Appraisal – Perceived Situational Control Versus Challenge/Threat Appraisals

The hypothesis H05 predicts that project managers appraise specific stressful events as being within their control, "amenable to change" and that this would be positively correlated to rating specific stressful events as "challenges" rather than "threats". An initial review of the scatter plots reveals no linear relationship between perceived control appraisals and appraisals of challenge for work, home or personal health stressors. The distribution is evenly spread across the graphs as shown in the scatter plots below in Figures 42-44. This distribution reveals the data to be uncorrelated and no subsequent correlations were performed. The hypothesis H05 is thus false.

Additional sub-sets of the data were also explored to ensure that no subsets showed correlations, but subsets by gender, age and removing potential outliers revealed the same pattern with no obvious linear or curvilinear relationships.

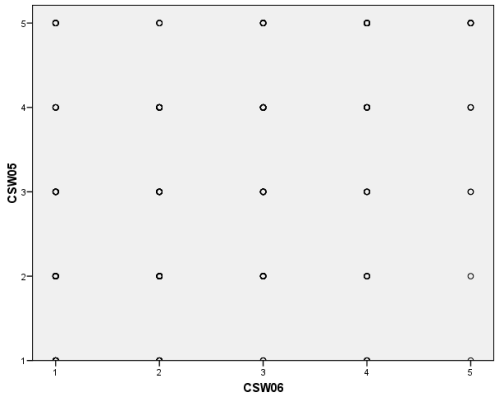

Figure 42 - Scatter Plot Primary Appraisal Work-based Stressor

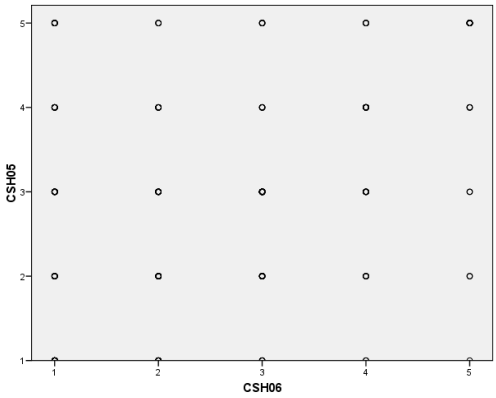

Figure 43 - Scatter Plot Primary Appraisal Home-based Stressor

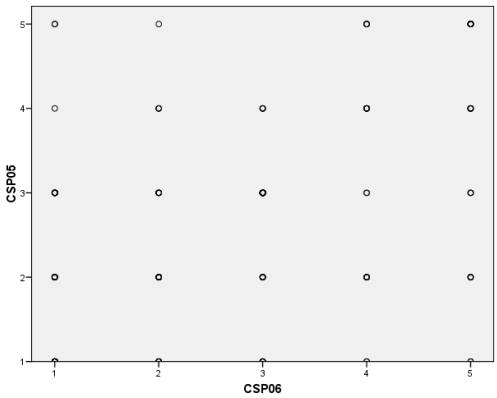

Figure 44 - Scatter Plot Primary Appraisal Personal Health Stressor

6.2.2 Primary Appraisal and its relationship to Coping Strategy Selection

Similarly the scatter plots analysis of primary appraisals for threat/challenge and perceived situational control revealed no clear linear relationships and further correlation analysis was not conducted. The weakness of the association between perceived control, primary appraisal and coping strategy selection indicates that hypothesis H09 which states that perceived control and primary appraisal will be predictors of coping strategy selection, is false. Further analysis is conducted and reported on in subsequent sections.

6.2.3 Secondary Appraisal – GSE and its relationship to Coping Strategy Selection

Hypothesis H07 states that Generalised Self Efficacy (GSE) will be positively correlated with the use of problem-focused coping strategies, specifically Active Coping and Planning across all three (3) domains, work, home and personal health. Scatter plots were analysed for both Active Coping and Planning. Moderately linear correlations can be seen in the scatter plots below in Figures 45-57. The strongest

linear relationships can be observed for the work-based stressors with weakening relationships for home and personal health stressors respectively. Pearson correlations were conducted with a 2 tailed significance test. The results are detailed in Tables 38-40 below. Active Coping is positively correlated with GSE for work (.187) and home (.158) based stressors but not for personal health. Planning does not correlate with GSE for work or home-based stressors but does have a small positive correlation for personal health (.158) stressors. These results partially prove hypothesis H07.

GSE also had a number of stronger correlations with other coping strategies that were not explicitly defined in the hypotheses. Acceptance, which reported strong usage in the dispositional coping strategy analysis reported in section 6.1.4, was positively correlated with GSE for both work (.229) and home (.158) based stressors. Positive reframing was also positively correlated (.211) with GSE for work-based stressors only. Use of Emotional Support, an emotion-focused coping strategy, was positively correlated with GSE for personal health stressors (.149). The only other correlation between GSE and coping strategy selection was a small negative correlation with Substance Use indicating that the more inclined project managers are to believe that their actions will lead to positive outcomes when managing stress the less likely they are to use drugs and alcohol to cope.

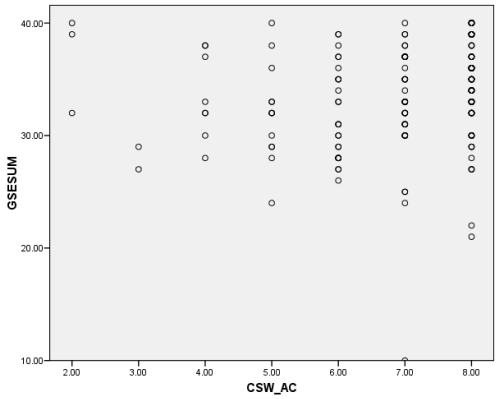

Figure 45 - Scatter Plot GSE versus Active Coping - Work-based Stressor

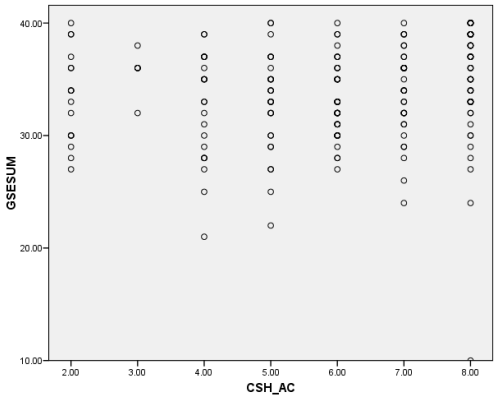

Figure 46 - Scatter Plot GSE versus Active Coping - Home-based Stressor

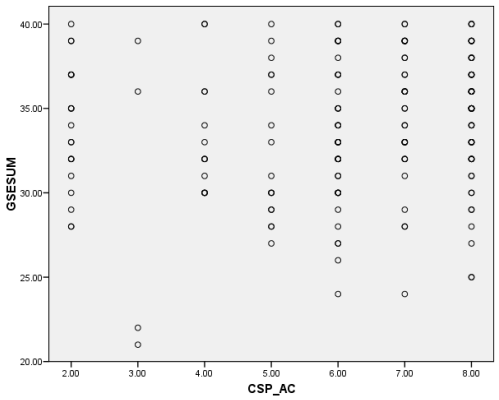

Figure 47 - Scatter Plot GSE versus Active Coping - Personal Health Stressor

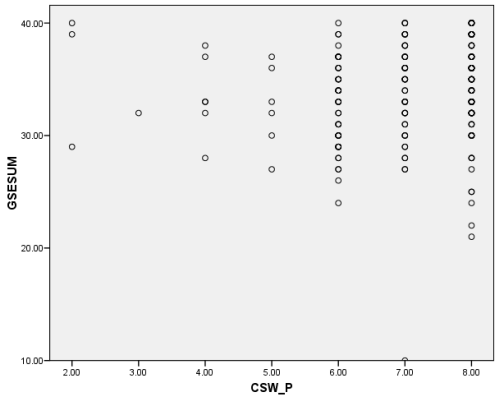

Figure 48 - Scatter Plot GSE versus Planning - Work-based Stressor

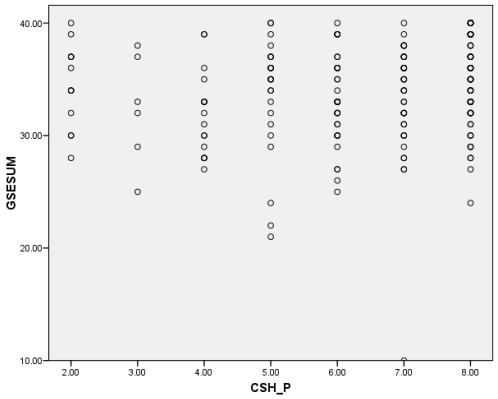

Figure 49 - Scatter Plot GSE versus Planning - Home-based Stressor

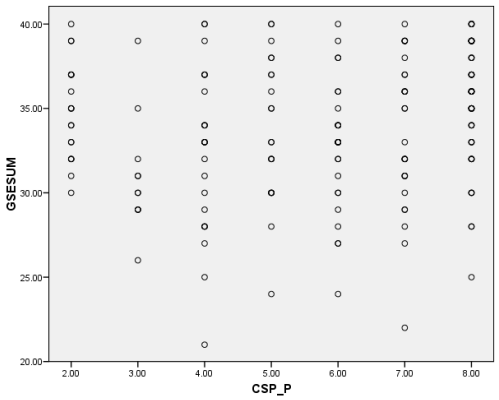

Figure 50 - Scatter Plot GSE versus Planning - Personal Health Stressor

Table 39 - GSE and Coping Strategy Correlations - Work-based Stressor

		GSESUM	CSW_SD	CSW_AC	CSW_D	CSW_SU	CSW_UES	CSW_UIS	CSW_BD	CSW_V	CSW_PR	CSW_P	CSW_H	CSW_A	CSW_R	CSW_SB
GSESUM	Pearson Cor	1	.054	.187(**)	-.033	-.150(*)	.029	-.080	-.087	-.079	.211(**)	.106	.003	.229(**)	.046	-.132
	Sig.(2-tailed)		.434	.006	.627	.028	.674	.243	.206	.246	.002	.120	.968	.001	.506	.053
	N	216	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_SD	Pearson Cor	.054	1	.087	.175(*)	.162(*)	.302(**)	.071	.139(*)	.226(**)	.203(**)	-.020	.057	.147(*)	.233(**)	.048
	Sig.(2-tailed)	.434		.206	.010	.018	.000	.298	.041	.001	.003	.774	.406	.031	.001	.488
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_AC	Pearson Cor	.187(**)	.087	1	-.012	-.145(*)	.126	.314(**)	-.231(**)	.149(*)	.269(**)	.672(**)	.101	.243(**)	.057	-.012
	Sig.(2-tailed)	.006	.206		.859	.034	.066	.000	.001	.029	.000	.000	.140	.000	.404	.862
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_D	Pearson Cor	-.033	.175(*)	-.012	1	.231(**)	.229(**)	.157(*)	.442(**)	.227(**)	-.008	-.062	.048	-.023	.169(*)	.312(**)
	Sig.(2-tailed)	.627	.010	.859		.001	.001	.021	.000	.001	.903	.368	.487	.736	.013	.000
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_SU	Pearson Cor	-.150(*)	.162(*)	-.145(*)	.231(**)	1	.049	-.060	.167(*)	.232(**)	-.028	-.101	-.003	-.061	-.050	.203(**)
	Sig.(2-tailed)	.028	.018	.034	.001		.477	.384	.015	.001	.683	.141	.967	.376	.469	.003
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_UES	Pearson Cor	.029	.302(**)	.126	.229(**)	.049	1	.528(**)	.191(**)	.408(**)	.200(**)	.113	.008	.118	.296(**)	.019
	Sig.(2-tailed)	.674	.000	.066	.001	.477		.000	.005	.000	.003	.100	.912	.085	.000	.786
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_UIS	Pearson Cor	-.080	.071	.314(**)	.157(*)	-.060	.528(**)	1	.098	.289(**)	.194(**)	.311(**)	.069	.039	.161(*)	.107
	Sig.(2-tailed)	.243	.298	.000	.021	.384	.000		.151	.000	.004	.000	.315	.574	.018	.118
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_BD	Pearson Cor	-.087	.139(*)	-.231(**)	.442(**)	.167(*)	.191(**)	.098	1	.153(*)	-.027	-.165(*)	.159(*)	-.033	.164(*)	.215(**)
	Sig.(2-tailed)	.206	.041	.001	.000	.015	.005	.151		.025	.695	.015	.020	.631	.016	.002
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_V	Pearson Cor	-.079	.226(**)	.149(*)	.227(**)	.232(**)	.408(**)	.289(**)	.153(*)	1	-.010	.105	.177(**)	.001	.114	.157(*)
	Sig.(2-tailed)	.246	.001	.029	.001	.001	.000	.000	.025		.880	.123	.010	.990	.095	.021
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_PR	Pearson Cor	.211(**)	.203(**)	.269(**)	-.008	-.028	.200(**)	.194(**)	-.027	-.010	1	.267(**)	.193(**)	.340(**)	.225(**)	.000
	Sig.(2-tailed)	.002	.003	.000	.903	.683	.003	.004	.695	.880		.000	.005	.000	.001	.998
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_P	Pearson Cor	.106	-.020	.672(**)	-.062	-.101	.113	.311(**)	-.165(*)	.105	.267(**)	1	.155(*)	.326(**)	.008	.059
	Sig.(2-tailed)	.120	.774	.000	.368	.141	.100	.000	.015	.123	.000		.023	.000	.906	.390
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_H	Pearson Cor	.003	.057	.101	.048	-.003	.008	.069	.159(*)	.177(**)	.193(**)	.155(*)	1	.208(**)	.048	.117
	Sig.(2-tailed)	.968	.406	.140	.487	.967	.912	.315	.020	.010	.005	.023		.002	.481	.087
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_A	Pearson Cor	.229(**)	.147(*)	.243(**)	-.023	-.061	.118	.039	-.033	.001	.340(**)	.326(**)	.208(**)	1	.061	-.014
	Sig.(2-tailed)	.001	.031	.000	.736	.376	.085	.574	.631	.990	.000	.000	.002		.375	.843
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_R	Pearson Cor	.046	.233(**)	.057	.169(*)	-.050	.296(**)	.161(*)	.164(*)	.114	.225(**)	.008	.048	.061	1	.078
	Sig.(2-tailed)	.506	.001	.404	.013	.469	.000	.018	.016	.095	.001	.906	.481	.375		.254
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSW_SB	Pearson Cor	-.132	.048	-.012	.312(**)	.203(**)	.019	.107	.215(**)	.157(*)	.000	.059	.117	-.014	.078	1
	Sig.(2-tailed)	.053	.488	.862	.000	.003	.786	.118	.002	.021	.998	.390	.087	.843	.254	
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 40 - GSE and Coping Strategy Correlations - Home-based Stressor

		GSESUM	CSH_SD	CSH_AC	CSH_D	CSH_SU	CSH_UES	CSH_UIS	CSH_BD	CSH_V	CSH_PR	CSH_P	CSH_H	CSH_A	CSH_R	CSH_SB
GSESUM	Pearson Cor	1	.005	.158(*)	-.033	-.132	.072	-.023	-.019	.053	.068	.126	.053	.158(*)	.072	-.091
	Sig.(2-tailed)		.940	.020	.632	.053	.291	.736	.779	.442	.323	.065	.442	.021	.291	.185
	N	216	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_SD	Pearson Cor	.005	1	-.017	.116	.188(**)	.258(**)	.128	.232(**)	.243(**)	.113	.000	.145(*)	.184(**)	.307(**)	.148(*)
	Sig.(2-tailed)	.940		.808	.091	.006	.000	.061	.001	.000	.097	.997	.034	.007	.000	.030
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_AC	Pearson Cor	.158(*)	-.017	1	-.010	-.076	.166(*)	.300(**)	-.232(**)	.118	.422(**)	.693(**)	.222(**)	.179(**)	.110	.016
	Sig.(2-tailed)	.020	.808		.889	.264	.015	.000	.001	.084	.000	.000	.001	.008	.108	.812
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_D	Pearson Cor	-.033	.116	-.010	1	.310(**)	.054	.155(*)	.320(**)	.249(**)	-.134	.048	-.076	-.193(**)	.001	.253(**)
	Sig.(2-tailed)	.632	.091	.889		.000	.430	.023	.000	.000	.050	.481	.269	.005	.991	.000
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_SU	Pearson Cor	-.132	.188(**)	-.076	.310(**)	1	.022	.004	.164(*)	.235(**)	-.151(*)	.024	-.032	-.071	-.119	.296(**)
	Sig.(2-tailed)	.053	.006	.264	.000		.753	.948	.016	.000	.027	.727	.637	.298	.083	.000
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_UES	Pearson Cor	.072	.258(**)	.166(*)	.054	.022	1	.583(**)	-.036	.184(**)	.330(**)	.239(**)	.092	.297(**)	.262(**)	.170(*)
	Sig.(2-tailed)	.291	.000	.015	.430	.753		.000	.601	.007	.000	.000	.181	.000	.000	.013
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_UIS	Pearson Cor	-.023	.128	.300(**)	.155(*)	.004	.583(**)	1	-.074	.287(**)	.216(**)	.399(**)	.158(*)	.094	.168(*)	.121
	Sig.(2-tailed)	.736	.061	.000	.023	.948	.000		.278	.000	.001	.000	.020	.170	.014	.078
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_BD	Pearson Cor	-.019	.232(**)	-.232(**)	.320(**)	.164(*)	-.036	-.074	1	.137(*)	-.115	-.148(*)	-.052	-.056	.062	.160(*)
	Sig.(2-tailed)	.779	.001	.001	.000	.016	.601	.278		.045	.094	.030	.446	.416	.365	.019
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_V	Pearson Cor	.053	.243(**)	.118	.249(**)	.235(**)	.184(**)	.287(**)	.137(*)	1	.070	.221(**)	.259(**)	.049	.037	.202(**)
	Sig.(2-tailed)	.442	.000	.084	.000	.000	.007	.000	.045		.308	.001	.000	.472	.586	.003
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_PR	Pearson Cor	.068	.113	.422(**)	-.134	-.151(*)	.330(**)	.216(**)	-.115	.070	1	.367(**)	.386(**)	.367(**)	.203(**)	-.031
	Sig.(2-tailed)	.323	.097	.000	.050	.027	.000	.001	.094	.308		.000	.000	.000	.003	.651
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_P	Pearson Cor	.126	.000	.693(**)	.048	.024	.239(**)	.399(**)	-.148(*)	.221(**)	.367(**)	1	.157(*)	.193(**)	.094	.096
	Sig.(2-tailed)	.065	.997	.000	.481	.727	.000	.000	.030	.001	.000		.021	.005	.170	.161
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_H	Pearson Cor	.053	.145(*)	.222(**)	-.076	-.032	.092	.158(*)	-.052	.259(**)	.386(**)	.157(*)	1	.263(**)	.046	-.065
	Sig.(2-tailed)	.442	.034	.001	.269	.637	.181	.020	.446	.000	.000	.021		.000	.499	.344
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_A	Pearson Cor	.158(*)	.184(**)	.179(**)	-.193(**)	-.071	.297(**)	.094	-.056	.049	.367(**)	.193(**)	.263(**)	1	.124	-.058
	Sig.(2-tailed)	.021	.007	.008	.005	.298	.000	.170	.416	.472	.000	.005	.000		.070	.399
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_R	Pearson Cor	.072	.307(**)	.110	.001	-.119	.262(**)	.168(*)	.062	.037	.203(**)	.094	.046	.124	1	.036
	Sig.(2-tailed)	.291	.000	.108	.991	.083	.000	.014	.365	.586	.003	.170	.499	.070		.596
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
CSH_SB	Pearson Cor	-.091	.148(*)	.016	.253(**)	.296(**)	.170(*)	.121	.160(*)	.202(**)	-.031	.096	-.065	-.058	.036	1
	Sig.(2-tailed)	.185	.030	.812	.000	.000	.013	.078	.019	.003	.651	.161	.344	.399	.596	
	N	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Table 41 - GSE and Coping Strategy Correlations - Personal Health Stressor

		GSESUM	CSP_SD	CSP_AC	CSP_D	CSP_SU	CSP_UES	CSP_UIS	CSP_BD	CSP_V	CSP_PR	CSP_P	CSP_H	CSP_A	CSP_R	CSP_SB
GSESUM	Pearson Cor	1	.077	.125	-.009	.078	.149(*)	.058	-.108	.133	.049	.158(*)	.066	.120	.031	-.132
	Sig.(2-tailed)		.292	.090	.904	.292	.042	.435	.144	.070	.509	.033	.368	.102	.675	.072
	N	216	187	186	186	185	186	186	186	186	186	184	186	186	186	186
CSP_SD	Pearson Cor	.077	1	.129	.173(*)	.165(*)	.298(**)	.141	.128	.336(**)	.235(**)	.207(**)	.220(**)	.270(**)	.225(**)	.178(*)
	Sig.(2-tailed)	.292		.079	.018	.025	.000	.054	.082	.000	.001	.005	.003	.000	.002	.015
	N	187	187	186	186	185	186	186	186	186	186	184	186	186	186	186
CSP_AC	Pearson Cor	.125	.129	1	-.151(*)	.034	.509(**)	.573(**)	-.161(*)	.219(**)	.461(**)	.679(**)	.284(**)	.500(**)	.255(**)	.025
	Sig.(2-tailed)	.090	.079		.040	.651	.000	.000	.028	.003	.000	.000	.000	.000	.000	.738
	N	186	186	186	185	184	185	185	185	185	185	183	185	185	185	185
CSP_D	Pearson Cor	-.009	.173(*)	-.151(*)	1	.232(**)	.080	.003	.143	.281(**)	-.131	.016	-.039	-.036	-.031	.133
	Sig.(2-tailed)	.904	.018	.040		.002	.278	.970	.051	.000	.075	.834	.603	.631	.679	.071
	N	186	186	185	186	184	185	185	185	185	185	184	185	185	185	185
CSP_SU	Pearson Cor	.078	.165(*)	.034	.232(**)	1	.124	.087	.130	.314(**)	-.061	.079	.186(*)	.162(*)	-.140	.210(**)
	Sig.(2-tailed)	.292	.025	.651	.002		.094	.238	.078	.000	.414	.292	.011	.028	.058	.004
	N	185	185	184	184	185	184	184	184	184	184	182	184	184	184	184
CSP_UES	Pearson Cor	.149(*)	.298(**)	.509(**)	.080	.124	1	.599(**)	-.087	.449(**)	.460(**)	.439(**)	.223(**)	.437(**)	.381(**)	.065
	Sig.(2-tailed)	.042	.000	.000	.278	.094		.000	.237	.000	.000	.000	.002	.000	.000	.379
	N	186	186	185	185	184	186	185	185	185	185	183	185	185	185	185
CSP_UIS	Pearson Cor	.058	.141	.573(**)	.003	.087	.599(**)	1	-.151(*)	.373(**)	.355(**)	.590(**)	.268(**)	.307(**)	.274(**)	.100
	Sig.(2-tailed)	.435	.054	.000	.970	.238	.000		.040	.000	.000	.000	.000	.000	.000	.174
	N	186	186	185	185	184	185	186	185	185	185	183	185	185	185	185
CSP_BD	Pearson Cor	-.108	.128	-.161(*)	.143	.130	-.087	-.151(*)	1	.145(*)	-.124	-.043	.006	.098	-.086	.290(**)
	Sig.(2-tailed)	.144	.082	.028	.051	.078	.237	.040		.050	.094	.559	.931	.184	.245	.000
	N	186	186	185	185	184	185	185	186	185	185	183	185	185	185	185
CSP_V	Pearson Cor	.133	.336(**)	.219(**)	.281(**)	.314(**)	.449(**)	.373(**)	.145(*)	1	.208(**)	.265(**)	.312(**)	.317(**)	.181(*)	.194(**)
	Sig.(2-tailed)	.070	.000	.003	.000	.000	.000	.000	.050		.004	.000	.000	.000	.014	.008
	N	186	186	185	185	184	185	185	185	186	185	183	185	185	185	185
CSP_PR	Pearson Cor	.049	.235(**)	.461(**)	-.131	-.061	.460(**)	.355(**)	-.124	.208(**)	1	.403(**)	.446(**)	.331(**)	.280(**)	.066
	Sig.(2-tailed)	.509	.001	.000	.075	.414	.000	.000	.094	.004		.000	.000	.000	.000	.376
	N	186	186	185	185	184	185	185	185	185	186	183	185	185	185	185
CSP_P	Pearson Cor	.158(*)	.207(**)	.679(**)	.016	.079	.439(**)	.590(**)	-.043	.265(**)	.403(**)	1	.245(**)	.439(**)	.251(**)	.196(**)
	Sig.(2-tailed)	.033	.005	.000	.834	.292	.000	.000	.559	.000	.000		.001	.000	.001	.008
	N	184	184	183	184	182	183	183	183	183	183	184	183	184	183	184
CSP_H	Pearson Cor	.066	.220(**)	.284(**)	-.039	.186(*)	.223(**)	.268(**)	.006	.312(**)	.446(**)	.245(**)	1	.297(**)	.088	.229(**)
	Sig.(2-tailed)	.368	.003	.000	.603	.011	.002	.000	.931	.000	.000	.001		.000	.234	.002
	N	186	186	185	185	184	185	185	185	185	185	183	186	185	185	185
CSP_A	Pearson Cor	.120	.270(**)	.500(**)	-.036	.162(*)	.437(**)	.307(**)	.098	.317(**)	.331(**)	.439(**)	.297(**)	1	.165(*)	.042
	Sig.(2-tailed)	.102	.000	.000	.631	.028	.000	.000	.184	.000	.000	.000	.000		.025	.569
	N	186	186	185	185	184	185	185	185	185	185	184	185	186	185	186
CSP_R	Pearson Cor	.031	.225(**)	.255(**)	-.031	-.140	.381(**)	.274(**)	-.086	.181(*)	.280(**)	.251(**)	.088	.165(*)	1	.027
	Sig.(2-tailed)	.675	.002	.000	.679	.058	.000	.000	.245	.014	.000	.001	.234	.025		.716
	N	186	186	185	185	184	185	185	185	185	185	183	185	185	186	185
CSP_SB	Pearson Cor	-.132	.178(*)	.025	.133	.210(**)	.065	.100	.290(**)	.194(**)	.066	.196(**)	.229(**)	.042	.027	1
	Sig.(2-tailed)	.072	.015	.738	.071	.004	.379	.174	.000	.008	.376	.008	.002	.569	.716	
	N	186	186	185	185	184	185	185	185	185	185	184	185	186	185	186

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

6.2.4 Correlations Between Coping Strategies

There are no specific hypotheses associated with the inter-relationship between the coping strategies selected however the univariate analysis and bivariate analysis revealed unexpectedly high ratings for coping strategies that are not singularly identifiable as problem or emotion focused coping strategies. In pursuit of a deeper understanding of the inter-relationship between the coping strategies selected across the three (3) domains the bivariate analysis reported in section 6.2.2 above is continued in this section.

The first analysis is conducted on the relationship between the use of Active Coping by respondents and the other thirteen (13) coping strategies. Active Coping was significantly correlated with Use of Informational Support, Behavioural Disengagement, Positive Reframing, Planning and Acceptance across all three (3) domains. Project managers who use Active Coping are more likely to use Planning, Use of Informational Support, Positively Reframe the situation and apply Acceptance. They are also less likely to use Behavioural Disengagement. The four (4) positively correlated coping strategies include two classic problem-focused strategies, Planning and Use of Instrumental Support and the two (2) strategies that border the categories of problem and emotion-focused coping are Positive Reframing and Acceptance. The largest correlation found is that between Active Coping and Planning, the two (2) focus points for this study, with 45.23%, 48.02% and 46.10% of the variance in the Active Coping scores explained by the use of Planning when coping with work, home and personal health stressors respectively. The next strongest correlation was that between Active Coping and Use of Instrumental Support which explained 9.9%, 9% and 32.83% of the variance for work, home and personal health stressors. The use of Active Coping to manage home and personal health stressors was also positively correlated with two (2) emotion focused coping strategies, Humour and Use of Emotional Support.

The second analysis is conducted on the relationship between use of Planning by respondents and the other thirteen (13) coping strategies. Similar patterns emerged to those found with Active Coping. Across all three (3) domains of work, home and personal health, Planning was positively correlated with Use of Instrumental Support,

Positive Reframing, Acceptance and Humour. The strongest correlation (after Active Coping and Planning) is with Acceptance. A negative correlation with Behavioural Disengagement, similar to that found between Active Coping and Behavioural Disengagement exists for work and home stressors. The use of Planning in coping with home and personal health stressors was positively correlated with Use of Emotional Support and Venting.

Finally an analysis of the remaining strong correlations (+/- .3 or more) revealed a number of strong correlations between coping strategy selections across the three (3) domains. The correlations were most numerous in the personal health domain where more coping strategies are applied in combination when dealing with personal health stressors. Unsurprisingly use of Emotional Support and Use of Instrumental Support are strongly correlated across all three domains explaining, 27.88%, 33.99% and 35.88% of the variance for work, home and personal health stressors. The other correlation that is common across all three domains was Acceptance and Positive Reframing, with 11.56%, 13.47% and 19.89% of the variance explained for work, home and personal health stressors. Strong positive correlations were found for Behavioural Disengagement and Denial for work and home-based stressors and between Positive Reframing and Use of Emotional Support for home and personal health stressors.

6.2.5 Correlations between project management culture and coping strategy selection

Hypotheses H10 and H11 state that (H10) project management culture will be positively correlated with the use of problem-focused coping strategies, specifically Active Coping and Planning across all three (3) domains of work, home and personal health stressors; and (H11) that project management culture will be negatively correlated with the use of emotion-focused coping strategies across all three (3) domains of work, home and personal health stressors. Project management culture is represented in this study by the three (3) measures of duration spent working in project management (PEQ07 and PEQ08), perceived organisational project management maturity (PEQ09) and individual project management competence represented by CQSUM and analysed at the sub-scale level (CQ1-CQ6).

a. Duration of Exposure to Project Management

The duration of exposure to project management is measured by two (2) questions, PEQ07, the number of years experience respondents have working in project management and PEQ08, the number of years experience respondents have working as project managers. The first is intended to provide a measure of length of time respondents have been exposed to a work environment that uses project management as the predominant means of conducting business and the latter is specifically about the time spent directly applying the skills of project management as a project manager which is the role at the core of project management that requires the highest level of planning and active problem solving to be applied in day to day work. It is posited by the researcher that it is this direct application of project management that has the greatest influence on coping strategy selection for project managers directing them to Planning and Active Coping.

An initial evaluation of the scatter plots revealed a very weak relationship between experience and Active Coping and Planning for work-based stressors. Scatter plots below in Figures 51-54 show the distribution of results. The strength of the relationship deteriorates for home and personal health stressors. The relationship was not strong enough to reveal any statistically significant relationship between the number of years project management or project manager experience and coping strategy selection. These results partially disprove H10 and H11.

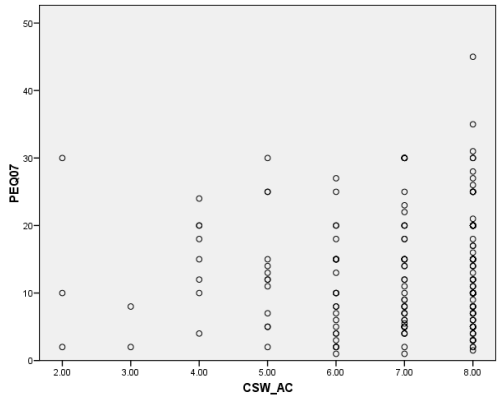

Figure 51 - Scatter Plot PM Experience versus Active Coping (Work-based Stressor)

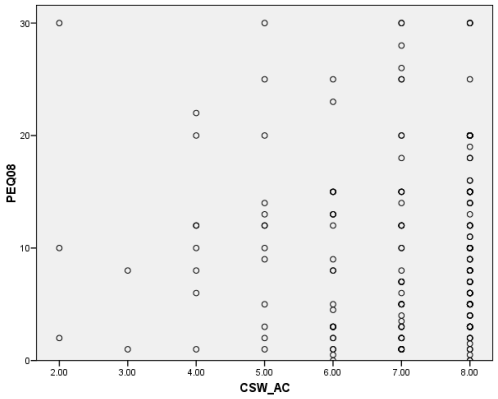

Figure 52 - Scatter Plot Project Manager Experience versus Active Coping (Work-based Stressor)

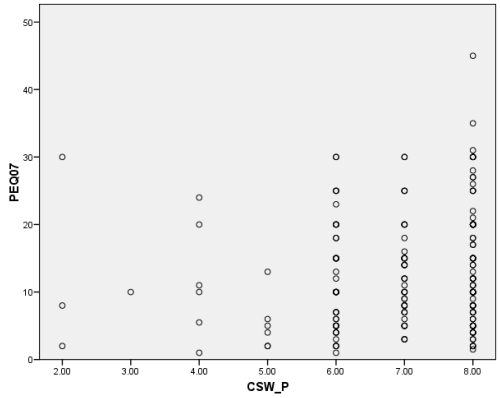

Figure 53 - Scatter Plot PM Experience versus Planning (Work-based Stressor)

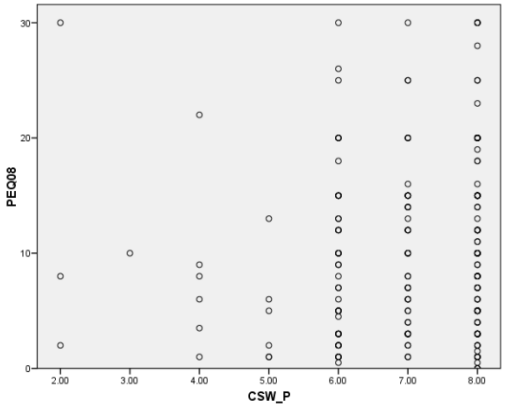

Figure 54 - Scatter Plot Project Manager Experience versus Planning (Work-based Stressor)

b. Perceived Organisational Maturity

Perceived organisational maturity is measured on a single item with respondents reporting the level of perceived project management maturity of the organisation in which they work. The scatter plots revealed a very weak relationship between perceived organisational maturity and coping strategy selection for work, home and personal health stressors. No significant correlations were obtained. This result partially disproves H10 and H11.

c. Individual Project Management Competence

Individual competence is measured as the application of project management activities as defined by the GAPPS project manager standard to two (2) recent work-based projects. The scatter plots for CQSUM, shown below, reveal a linear

relationship to be evident for work-based stressors and weakening for home and personal health for Planning and Active Coping the two (2) problem-focused coping strategies identified in hypothesis H10.

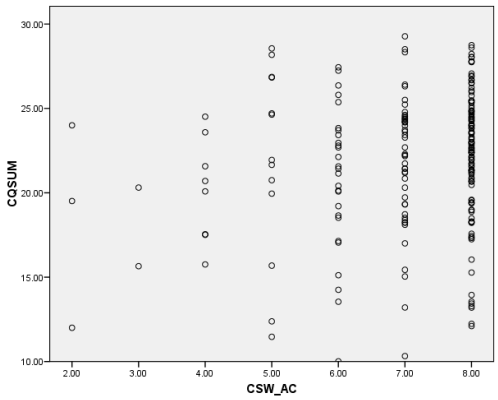

Figure 55 - Scatter Plot CQSUM and Active Coping - Work-based Stressor

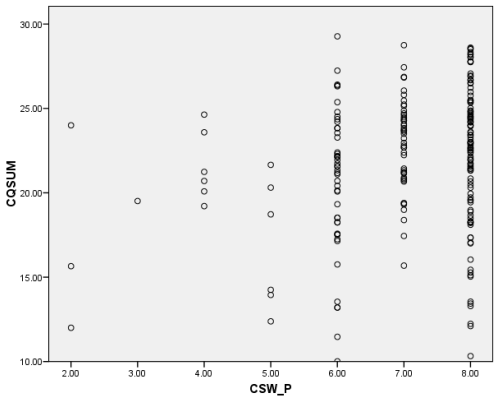

Figure 56 - Scatter Plot CQSUM and Planning - Work-based Stressor

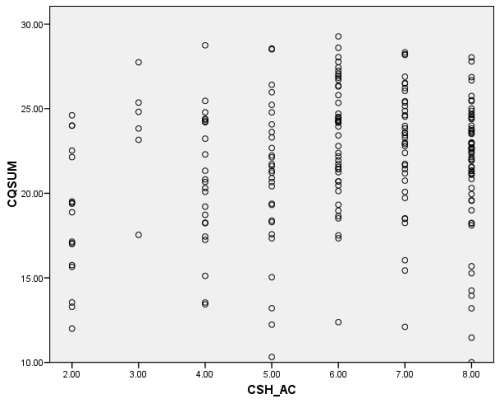

Figure 57 - Scatter Plot CQSUM and Active Coping - Home-based Stressor

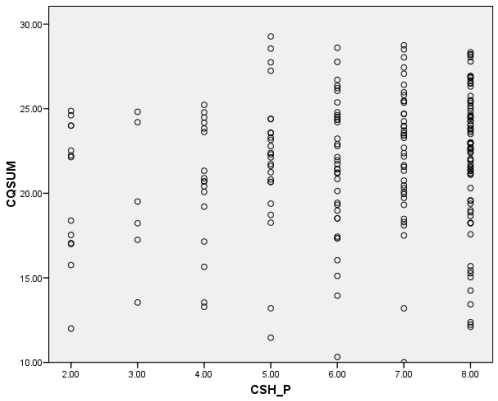

Figure 58 - Scatter Plot CQSUM and Planning - Home-based Stressor

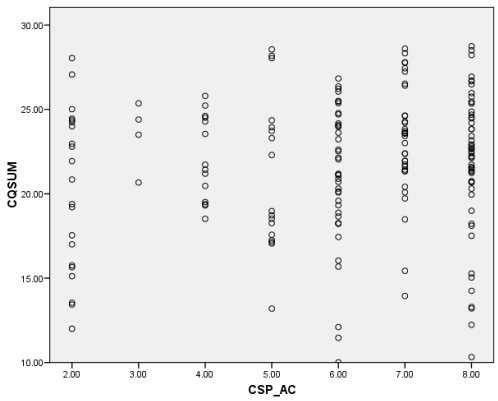

Figure 59 - Scatter Plot CQSUM and Active Coping - Personal Health Stressor

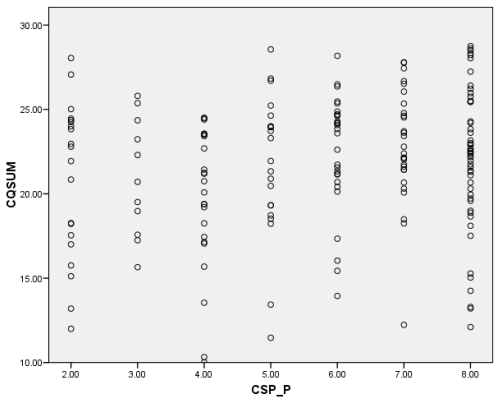

Figure 60 - Scatter Plot CQSUM and Planning - Personal Health Stressor

The full correlation analysis is shown in Tables 42, 43, 44 below and significant correlations are highlighted. Planning was found to be significantly and positively correlated to CQSUM across all three (3) domains of work, home and personal health stressors partially supporting hypothesis H10 that project management culture (as represented by individual project management competence) is positively correlated to problem-focused coping strategy selection across all three (3) domains. Active Coping was significantly correlated to CQSUM for work and home-based stressors but not personal health stressors, again providing partial support for hypothesis H10. The only other coping strategy to reveal a statistically significant correlation was that of Use Informational Support, a problem-focused strategy, which was positively correlated to both work and personal health stressors but not home-based stressors.

Within the measure of individual project management competence (CQSUM) there are six (6) subscales. Although not specifically hypothesized to be independently related to coping strategy selection an analysis of the relationships between the subscales within CQSUM and coping strategy selection were analysed to determine if any of the practices within the GAPPS standard have relationships with the coping strategies selected. CQ2, Manage the Development of the Plan for the Project has the strongest correlation with Planning across all three (3) domains. This subscale is primarily focused on the planning activities related to project management. CQ1 (Manage Stakeholder Relationships), CQ3 (Manage Project Progress) and CQ6 (Project Performance Evaluation & Improvement also have moderate and positive correlations with Planning across all three (3) domains further supporting H10. CQ4, Manage Product Acceptance has no statistically significant relationship to Active Coping or Planning. This may be explained by the fact that the activities defined in CQ4 relate to the ongoing management of project products rather than either the problem solving aspects of developing project or planning. CQ3, Manage Project Progress, does not have a strong or consistent correlation with Active Coping or Use of Instrumental Support.

No statistically significant correlations were found between individual project management competence and the use of emotion-focused coping strategies. Thus the

hypothesis H11, that project management culture will be negatively correlated with the use of emotion-focused coping strategies, is false.

Table 42 - Correlations Individual Project Management Competence and Coping Strategy Selection - Work-based Stressors

		CQSUM	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
CSW_SD	Pearson Correlation	.032	.006	.051	.043	.042	.084	-.037
	Sig. (2-tailed)	.638	.932	.456	.532	.543	.222	.585
	N	215	215	215	215	215	215	215
CSW_AC	Pearson Correlation	**.176(**)**	**.172(*)**	**.251(**)**	.121	.060	**.145(*)**	**.162(*)**
	Sig. (2-tailed)	.010	.011	.000	.077	.381	.033	.017
	N	215	215	215	215	215	215	215
CSW_D	Pearson Correlation	.012	-.071	.028	.036	.017	.041	.004
	Sig. (2-tailed)	.866	.303	.681	.599	.809	.546	.955
	N	215	215	215	215	215	215	215
CSW_SU	Pearson Correlation	-.007	-.041	.019	.047	.069	-.057	-.053
	Sig. (2-tailed)	.917	.552	.778	.489	.316	.404	.439
	N	215	215	215	215	215	215	215
CSW_UES	Pearson Correlation	.017	.014	.011	-.032	-.007	.086	.009
	Sig. (2-tailed)	.805	.843	.867	.643	.920	.210	.895
	N	215	215	215	215	215	215	215
CSW_UIS	Pearson Correlation	**.178(**)**	**.150(*)**	**.176(**)**	.131	**.161(*)**	**.153(*)**	**.143(*)**
	Sig. (2-tailed)	.009	.028	.010	.056	.018	.025	.036
	N	215	215	215	215	215	215	215
CSW_BD	Pearson Correlation	.017	.026	-.019	.059	.035	.031	-.029
	Sig. (2-tailed)	.801	.701	.786	.393	.606	.650	.676
	N	215	215	215	215	215	215	215
CSW_V	Pearson Correlation	-.025	-.086	-.039	-.020	-.017	-.010	.018
	Sig. (2-tailed)	.712	.207	.569	.770	.807	.885	.791
	N	215	215	215	215	215	215	215
CSW_PR	Pearson Correlation	.096	.079	.132	.096	-.029	.093	.115
	Sig. (2-tailed)	.163	.248	.053	.159	.674	.173	.091
	N	215	215	215	215	215	215	215
CSW_P	Pearson Correlation	**.226(**)**	**.178(**)**	**.251(**)**	**.212(**)**	.119	**.169(*)**	**.226(**)**
	Sig. (2-tailed)	.001	.009	.000	.002	.082	.013	.001
	N	215	215	215	215	215	215	215
CSW_H	Pearson Correlation	.090	.033	.044	.074	.102	.087	.099
	Sig. (2-tailed)	.189	.631	.526	.278	.135	.203	.148
	N	215	215	215	215	215	215	215
CSW_A	Pearson Correlation	.113	.126	.108	.077	.017	.157(*)	.094
	Sig. (2-tailed)	.100	.064	.114	.259	.802	.022	.170
	N	215	215	215	215	215	215	215
CSW_R	Pearson Correlation	.050	.035	.054	.068	-.045	.075	.064
	Sig. (2-tailed)	.469	.615	.431	.319	.515	.273	.350
	N	215	215	215	215	215	215	215
CSW_SB	Pearson Correlation	-.008	.056	.026	.051	-.042	-.003	-.083
	Sig. (2-tailed)	.904	.414	.701	.459	.539	.963	.225
	N	215	215	215	215	215	215	215

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 43 - Correlations Individual Project Management Competence and Coping Strategy Selection - Home-based Stressors

		CQSUM	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
CSH_SD	Pearson Correlation	.051	-.024	.077	.094	.026	.023	.062
	Sig. (2-tailed)	.457	.724	.263	.171	.709	.737	.364
	N	215	215	215	215	215	215	215
CSH_AC	Pearson Correlation	**.180(**)**	**.172(*)**	**.194(**)**	**.188(**)**	.060	**.154(*)**	**.163(*)**
	Sig. (2-tailed)	.008	.012	.004	.006	.378	.024	.017
	N	215	215	215	215	215	215	215
CSH_D	Pearson Correlation	.019	-.016	.021	.048	.013	-.013	.038
	Sig. (2-tailed)	.781	.815	.764	.484	.845	.848	.580
	N	215	215	215	215	215	215	215
CSH_SU	Pearson Correlation	.072	.083	.056	.090	.072	.062	.023
	Sig. (2-tailed)	.293	.228	.415	.187	.294	.364	.738
	N	215	215	215	215	215	215	215
CSH_UES	Pearson Correlation	.036	.081	.034	.037	-.015	.037	.022
	Sig. (2-tailed)	.597	.236	.616	.594	.832	.587	.748
	N	215	215	215	215	215	215	215
CSH_UIS	Pearson Correlation	.045	.025	.029	.085	.011	.062	.023
	Sig. (2-tailed)	.515	.719	.669	.213	.876	.365	.732
	N	215	215	215	215	215	215	215
CSH_BD	Pearson Correlation	.013	.016	.046	-.015	-.016	.009	.023
	Sig. (2-tailed)	.854	.811	.501	.830	.819	.896	.738
	N	215	215	215	215	215	215	215
CSH_V	Pearson Correlation	.044	-.003	.006	.080	.054	.025	.051
	Sig. (2-tailed)	.522	.968	.933	.241	.429	.711	.455
	N	215	215	215	215	215	215	215
CSH_PR	Pearson Correlation	.119	.159(*)	.126	.133	.050	.049	.104
	Sig. (2-tailed)	.083	.020	.065	.052	.463	.476	.127
	N	215	215	215	215	215	215	215
CSH_P	Pearson Correlation	**.162(*)**	**.173(*)**	**.144(*)**	**.199(**)**	.059	.126	**.141(*)**
	Sig. (2-tailed)	.017	.011	.035	.003	.388	.066	.039
	N	215	215	215	215	215	215	215
CSH_H	Pearson Correlation	**.142(*)**	.115	.075	.128	.094	**.174(*)**	.129
	Sig. (2-tailed)	.038	.093	.277	.061	.168	.011	.060
	N	215	215	215	215	215	215	215
CSH_A	Pearson Correlation	.093	.109	.077	.102	.032	.057	.097
	Sig. (2-tailed)	.176	.110	.261	.135	.638	.405	.158
	N	215	215	215	215	215	215	215
CSH_R	Pearson Correlation	-.006	-.007	.008	.041	-.072	-.009	.013
	Sig. (2-tailed)	.932	.919	.910	.551	.293	.891	.852
	N	215	215	215	215	215	215	215
CSH_SB	Pearson Correlation	.104	.066	.134	**.135(*)**	.116	.079	.031
	Sig. (2-tailed)	.128	.338	.050	.049	.089	.250	.652
	N	215	215	215	215	215	215	215

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 44 - Correlations Individual Project Management Competence and Coping Strategy Selection - Personal Health Stressors

		CQSUM	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
CSP_SD	Pearson Correlation	.095	.095	.104	.086	.017	.138	.060
	Sig. (2-tailed)	.196	.194	.158	.241	.819	.059	.411
	N	187	187	187	187	187	187	187
CSP_AC	Pearson Correlation	.119	.121	.098	.098	.025	**.145(*)**	.118
	Sig. (2-tailed)	.107	.101	.182	.183	.738	.048	.109
	N	186	186	186	186	186	186	186
CSP_D	Pearson Correlation	.088	.143	.102	.103	.013	.100	.025
	Sig. (2-tailed)	.233	.051	.168	.163	.864	.175	.730
	N	186	186	186	186	186	186	186
CSP_SU	Pearson Correlation	.109	.144	.054	.124	.063	.066	.108
	Sig. (2-tailed)	.139	.051	.469	.092	.396	.372	.143
	N	185	185	185	185	185	185	185
CSP_UES	Pearson Correlation	.040	.060	.057	.046	-.064	.067	.046
	Sig. (2-tailed)	.592	.417	.440	.537	.383	.365	.534
	N	186	186	186	186	186	186	186
CSP_UIS	Pearson Correlation	.204(**)	.139	**.163(*)**	**.165(*)**	.112	**.222(**)**	**.220(**)**
	Sig. (2-tailed)	.005	.059	.027	.024	.129	.002	.003
	N	186	186	186	186	186	186	186
CSP_BD	Pearson Correlation	-.037	.005	.061	-.010	.017	-.095	-.119
	Sig. (2-tailed)	.614	.948	.411	.888	.819	.196	.107
	N	186	186	186	186	186	186	186
CSP_V	Pearson Correlation	.088	.120	.039	.105	.030	.122	.050
	Sig. (2-tailed)	.231	.103	.597	.153	.680	.097	.499
	N	186	186	186	186	186	186	186
CSP_PR	Pearson Correlation	.136	.169(*)	.098	.164(*)	.021	.141	.116
	Sig. (2-tailed)	.064	.021	.183	.025	.772	.055	.115
	N	186	186	186	186	186	186	186
CSP_P	Pearson Correlation	**.178(*)**	**.169(*)**	**.170(*)**	**.176(*)**	.026	**.201(**)**	**.173(*)**
	Sig. (2-tailed)	.016	.022	.021	.017	.723	.006	.019
	N	184	184	184	184	184	184	184
CSP_H	Pearson Correlation	.141	.111	.105	.136	.103	.104	.150(*)
	Sig. (2-tailed)	.054	.130	.154	.064	.162	.156	.041
	N	186	186	186	186	186	186	186
CSP_A	Pearson Correlation	.081	.072	.105	.083	-.002	.102	.067
	Sig. (2-tailed)	.269	.327	.154	.260	.980	.166	.365
	N	186	186	186	186	186	186	186
CSP_R	Pearson Correlation	.031	.061	.073	.068	-.061	.052	-.005
	Sig. (2-tailed)	.675	.405	.325	.354	.408	.482	.950
	N	186	186	186	186	186	186	186
CSP_SB	Pearson Correlation	-.065	.018	-.058	-.033	-.057	-.024	-.134
	Sig. (2-tailed)	.381	.810	.432	.653	.437	.743	.068
	N	186	186	186	186	186	186	186

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.2.6 Correlations between project management culture and GSE

Hypothesis H14 states that project management culture will be positively correlated with GSE scores. The results of the Pearson correlation between project management culture (PEQ07, PEQ08, PEQ09, CSUM, CQ1-CQ6) and GSESUM are shown in Table 45 below. There are no significant relationships between GSE and the external project management culture factors of duration of experience or organisational project management maturity. There is a small but significant positive correlation between individual project management competence and GSE. The analysis continues to the sub-scales within the CQSUM measure revealing significant positive correlations between CQ1, CQ2, CQ3, CQ5 and CQ6 with the strongest correlations being between GSE and CQ2 (Manage the development of the plan for the project) and CQ6 (Evaluate and Improve Project Performance). These findings partially prove hypothesis H14. Similar to the other findings in this study, these results place into question the conceptualization of project management culture as it is being constructed of duration of experience, organisational maturity and individual competence. These findings support the notion that only the application of demonstrable skills by an individual, such as planning (as defined by CQ2), influence the control and coping process.

Table 45 - Correlations GSE and Project Management Culture

		GSESUM
PEQ07	Pearson Correlation	.115
	Sig. (2-tailed)	.094
	N	214
PEQ08	Pearson Correlation	.107
	Sig. (2-tailed)	.118
	N	214
PEQ09	Pearson Correlation	.079
	Sig. (2-tailed)	.246
	N	216
CQSUM	Pearson Correlation	**.190(**)**
	Sig. (2-tailed)	.005
	N	215
CQ1	Pearson Correlation	**.164(*)**
	Sig. (2-tailed)	.016
	N	215
CQ2	Pearson Correlation	**.209(**)**
	Sig. (2-tailed)	.002
	N	215
CQ3	Pearson Correlation	**.156(*)**

	Sig. (2-tailed)	.022
	N	215
CQ4	Pearson Correlation	.043
	Sig. (2-tailed)	.531
	N	215
CQ5	Pearson Correlation	.187(**)
	Sig. (2-tailed)	.006
	N	215
CQ6	Pearson Correlation	.204(**)
	Sig. (2-tailed)	.003
	N	216
GSESUM	Pearson Correlation	1
	Sig. (2-tailed)	
	N	216

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.2.7 Summary of Correlation Analysis

The findings from the univariate analysis showed that project managers use more Active Coping, Planning, Positive Reframing, Use of Informational Support and Acceptance when dealing with stress across all three (3) domains of work, home and personal health. The bivariate analysis reveals strong correlations between the use of Active Coping and Planning across all three (3) domains as well as with Use of Instrumental Support. No statistically significant correlations were found between Active Coping or Planning and the emotion-focused coping strategies used across the three domains.

No support was found for the hypothesis (H05) that perceived control of specific stressful situations is positively correlated with an appraisal of challenge rather than threat and only partial support was found for the hypothesis (H07) that GSE is positively correlated to selection of Active Coping and Planning coping strategies. Active Coping and GSE are positively correlated for work and home-based stressors and Planning and GSE are correlated for personal health stressors.

The analysis of the relationship between project management culture and coping strategy selection revealed no statistically significant correlations between the number of years working in project management or as a project manager and the use of problem-focused coping strategies. Similarly no relationship was found between perceived organisational project management maturity and coping strategy selection.

However, a small positive correlation was found between individual project management competence and the use of Planning when coping with stressful situations across all three (3) domains, work, home and personal health. Active Coping and individual project management competence were found to be positively correlated for work and home stressors. Finally a small positive correlation between Use of Informational Support and individual project management competence was found for work and personal health stressors. The hypothesis, H10, that project management culture is positively correlated to the use of Active Coping and Planning was partially supported. Hypothesis H14 was partially supported with individual project management competence being positively correlated to GSE. These results lead to the conclusion that the components of project management culture being used in this study are not equally influential on the psychology of project managers in coping with stress. The analysis indicates that actual activities performed by project managers such as planning projects, documenting and analysing risks and other specific activities prescribed in the GAPPS standard are more influential in forming behaviours than simply being immersed in an environment of project management. Hypothesis H11 was disproved, no relationships were found between emotion-focused coping strategy selection and project management culture.

Overall the correlation analysis reveals that perceived control has a limited influence on the coping strategy selection and that the application of project management as measured by individual project management competence has a small but significant relationship to coping strategy selection, in particular the use of Planning and Active Coping. Although this relationship exists, the ability of project management competence to predict the use of Active Coping and Planning is still to be explored and is reported on in the following section based on the use of regression analysis.

6.2.8 Predictability of Coping Strategy Selection by Perceived Control

The univariate and correlation analyses reported in previous sections reveal a very weak and inconsistent association between perceived control of specific situations, primary appraisal, GSE and coping strategy selection. The correlations were too weak to support hypothesis H07, that GSE is positively correlated to the use of problem-focused coping strategies, specifically Active Coping and Planning. Hypothesis H08

is an extension of H07 proposing that GSE is a predictor of the use of Active Coping and Planning and H09 predicts that the combined model of perceived situational control, primary appraisal of challenge/threat and GSE will predict the use of problem-focused coping strategies, specifically Active Coping and Planning. The correlation analysis reported in sections 7.2.2 and 7.2.3 is sufficient to disprove the predictive ability of perceived control, primary appraisal and GSE of the use of Planning. There are however some indicators that GSE in particular may be a predictor of Active Coping, Positive Reframing and Acceptance for work-based stressors, of Active Coping and Acceptance for home-based stressors and of Planning for personal health stressors. A regression analysis was conducted for each coping strategy using each domain as the dependent variable and perceived situation control, primary challenge/threat appraisal and GSE as the independent variables.

Regression Analysis – Work-based Stressor
Independent Variable: CSW_AC, CSW_PR, CSW_A
Dependent Variables: CSW05, CSW06, GSESUM

Regression Analysis – Home-based Stressor
Independent Variable: CSH_AC, CSH_A
Dependent Variables: CSH05, CSH06, GSESUM

Regression Analysis – Personal Health Stressor
Independent Variable: CSP_P
Dependent Variables: CSW05, CSW06, GSESUM

The results are as follows.

a. Work-based stressor – Active Coping

A standard regression analysis was conducted with the dependent variable being Active Coping (CSW_AC) and the independent variables, perceived situation control of the work-based stressor (CSW05), the primary appraisal of the work-based stressor (CSW06) and GSE (GSESUM). The model only explains 3.7% of the variance in Active Coping. GSE is the greatest contributor to variance and is the only contributor to be statistically significant. Neither perceived control nor primary appraisal are significant contributors to variation and are not predictors of the use of Active Coping.

Table 46 - Model Summary - Work-based Stressor - Active Coping - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.225(a)	.051	.037	1.29365

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_AC

Table 47 - ANOVA - Work-based Stressor - Active Coping - Control Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.841	3	6.280	3.753	.012(a)
	Residual	353.112	211	1.674		
	Total	371.953	214			

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_AC

Table 48 - Coefficients - Work-based Stressor - Active Coping - Control Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	4.933	.716		6.890	.000	3.522	6.345					
	GSESUM	.052	.021	.169	2.485	.014	.011	.093	.187	.169	.167	.972	1.029
	CSW05	.012	.071	.012	.174	.862	-.128	.153	.076	.012	.012	.885	1.130
	CSW06	.133	.078	.122	1.720	.087	-.020	.286	.148	.118	.115	.889	1.125

a Dependent Variable: CSW_AC

b. Work-based stressor – Positive Reframing

A standard regression analysis was conducted with the dependent variable being Positive Reframing (CSW_PR) and the independent variables, perceived situation control of the work-based stressor (CSW05), the primary appraisal of the work-based stressor (CSW06) and GSE (GSESUM). The model explains 12.6% of the variance in Positive Reframing. Primary appraisal (threat/challenge) (CSW05) of the specific event is the greatest contributor to variance, both primary appraisal (threat/challenge) and GSE's contributions are statistically significant. Perceived control does not contribute to the variance in use of Positive Reframing.

Table 49 - Model Summary - Work-based Stressor - Positive Reframing - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.355(a)	.126	.114	1.62461

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_PR

Table 50 - ANOVA - Work-based Stressor - Positive Reframing - Control Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	80.354	3	26.785	10.148	.000(a)
	Residual	556.902	211	2.639		
	Total	637.256	214			

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_PR

Table 51 - Coefficients - Work-based Stressor - Positive Reframing - Control Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	1.717	.899		1.909	.058	-.056	3.490					
	GSESUM	.066	.026	.164	2.513	.013	.014	.118	.211	.170	.162	.972	1.029
	CSW05	.332	.090	.253	3.700	.000	.155	.509	.303	.247	.238	.885	1.130
	CSW06	.115	.097	.081	1.184	.238	-.077	.308	.184	.081	.076	.889	1.125

a Dependent Variable: CSW_PR

c. Work-based stressor – Acceptance

A standard regression analysis was conducted with the dependent variable being Acceptance (CSW_A) and the independent variables, perceived situation control of the work-based stressor (CSW05), the primary appraisal of the work-based stressor (CSW06) and GSE (GSESUM). The model explains 7.2% of the variance in Acceptance. Both GSE and perceived control are statistically significant contributors to variance with GSE being the greatest contributor.

Table 52 - Model Summary - Work-based Stressor - Acceptance - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.267(a)	.072	.058	1.48763

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_A

Table 53 - ANOVA - Work-based Stressor - Acceptance - Control Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.980	3	11.993	5.419	.001(a)
	Residual	466.950	211	2.213		
	Total	502.930	214			

a Predictors: (Constant), CSW06, GSESUM, CSW05
b Dependent Variable: CSW_A

Table 54 - Coefficients - Work-based Stressor - Acceptance - Control Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	3.665	.823		4.451	.000	2.042	5.288					
	GSESUM	.087	.024	.244	3.630	.000	.040	.135	.229	.242	.241	.972	1.029
	CSW05	.029	.082	.025	.355	.723	-.133	.191	.014	.024	.024	.885	1.130
	CSW06	-.184	.089	-.145	-2.058	.041	-.360	-.008	-.105	-.140	-.137	.889	1.125

a Dependent Variable: CSW_A

d. Home-based stressor – Active Coping

A standard regression analysis was conducted with the dependent variable being Active Coping (CSH_AC) and the independent variables, perceived situation control of the home-based stressor (CSH05), the primary appraisal of the home-based stressor (CSH06) and GSE (GSESUM). The model explains 8.6% of the variance in Active Coping. Both perceived control and primary appraisal (threat/challenge) contribute significantly to the variation.

Table 55 - Model Summary - Home-based Stressor - Active Coping - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.294(a)	.086	.073	1.76553

a Predictors: (Constant), CSH06, GSESUM, CSH05
b Dependent Variable: CSH_AC

Table 56 - ANOVA - Home-based Stressor - Active Coping - Control Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.124	3	20.708	6.643	.000(a)
	Residual	657.709	211	3.117		
	Total	719.833	214			

a Predictors: (Constant), CSH06, GSESUM, CSH05
b Dependent Variable: CSH_AC

Table 57 - Coefficients - Home-based Stressor - Active Coping - Control Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error

1	(Constant)	3.029	.979		3.095	.002	1.100	4.958					
	GSESUM	.053	.029	.124	1.864	.064	-.003	.109	.158	.127	.123	.977	1.024
	CSH05	.218	.101	.157	2.167	.031	.020	.417	.232	.148	.143	.825	1.212
	CSH06	.199	.101	.142	1.976	.049	.001	.397	.213	.135	.130	.841	1.189

a Dependent Variable: CSH_AC

e. Home-based stressor – Acceptance

A standard regression analysis was conducted with the dependent variable being Acceptance (CSH_A) and the independent variables, perceived situation control of the home-based stressor (CSH05), the primary appraisal of the home-based stressor (CSH06) and GSE (GSESUM). The model explains 7.4% of the variance in Acceptance. Primary appraisal (threat/challenge) of the specific event is the greatest contributor to variance. All three (3) measures of control are statistically significant.

Table 58 - Model Summary - Home-based Stressor - Acceptance - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.272(a)	.074	.061	1.75987

a Predictors: (Constant), CSH06, GSESUM, CSH05
b Dependent Variable: CSH_A

Table 59 - ANOVA - Home-based Stressor - Acceptance - Control Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.113	3	17.371	5.609	.001(a)
	Residual	653.496	211	3.097		
	Total	705.609	214			

a Predictors: (Constant), CSH06, GSESUM, CSH05
b Dependent Variable: CSH_A

Table 60 - Coefficients - Home-based Stressor - Acceptance - Control Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	3.954	.975		4.053	.000	2.031	5.877					
	GSESUM	.058	.028	.137	2.047	.042	.002	.114	.158	.140	.136	.977	1.024
	CSH05	.299	.100	.217	2.978	.003	.101	.497	.164	.201	.197	.825	1.212
	CSH06	-.257	.100	-.185	-2.567	.011	-.455	-.060	-.089	-.174	-.170	.841	1.189

a Dependent Variable: CSH_A

f. Personal health stressor - Planning

A standard regression analysis was conducted with the dependent variable being Planning (CSP_P) and the independent variables, perceived situation control of the personal health stressor (CSP05), the primary appraisal of the personal health stressor (CSP06) and GSE (GSESUM). The model explains 8.3% of the variance in Planning. Perceived control is the greatest contributor to variance however GSE is also statistically significant.

Table 61 - Model Summary - Personal Health - Planning - Control Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.288(a)	.083	.067	1.96598

a Predictors: (Constant), CSP06, GSESUM, CSP05
b Dependent Variable: CSP_P

Table 62 - ANOVA - Personal Health - Planning - Control Regression

Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	61.303	3	20.434	5.287	.002(a)
	Residual	676.388	175	3.865		
	Total	737.691	178			

a Predictors: (Constant), CSP06, GSESUM, CSP05
b Dependent Variable: CSP_P

Table 63 - Coefficients - Personal Health - Planning - Control Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	2.631	1.193		2.205	.029	.276	4.986					
	GSESUM	.069	.035	.144	1.983	.049	.000	.137	.158	.148	.144	.989	1.011
	CSP05	-.096	.133	-.060	-.724	.470	-.358	.166	.085	-.055	-.052	.754	1.325
	CSP06	.388	.121	.266	3.196	.002	.148	.627	.247	.235	.231	.758	1.319

a Dependent Variable: CSP_P

6.2.9 *Predictability of Coping Strategy Selection based on Project Management Culture*

Hypothesis H12 states that project management culture will be a predictor of the use of Active Coping and Planning when coping with stress at work, home and with personal health issues. The correlation analysis has thus far shown no significant relationship between duration of experience in the project management industry or perceived organisational project management maturity and the use of Active Coping and Planning. However it has shown that individual project management competence has a positive correlation with use of Active Coping, Planning and in some cases Use of Instrumental Support. Two (2) regression models were applied, the first is a full model based on the original hypothesis, and results are expected to confirm that duration and perceived organisational maturity are not predictive of coping strategy selection. The second model explores the predictive nature of the six (6) subscales of CQSUM.

1. Original Project Culture Model

A standard regression was run for each of the nine (9) dependent variables listed below using the four (4) independent variables for project management culture.

Dependent Variable: Coping Strategy (CSW_AC, CSW_P, CSW_UIS, CSH_AC, CSH_P, CSH_UIS, CSP_AC, CSP_P, CSP_UIS)
Independent Variables: PEQ07, PEQ08, PEQ09, CQSUM

a. Work-based Stressors - Active Coping

The standard regression analysis exploring the question how well do the various components of project management culture predict the use of Active Coping with work-based stressors returned an R = .235 and R^2= .055. The model was statistically significant (.018). The model explains 5.5% of the variance in Active Coping scores for work-based stressors. A detailed analysis reveals that CQSUM is the only statistically significant contributor to the variance. The detailed coefficients are shown in Table 64 below.

Table 64 - Regression Coefficients - PM Culture - Work-based Stressors - Active Coping

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	5.907	.540		10.946	.000	4.843	6.971					
	CQSUM	.068	.024	.209	2.831	.005	.021	.116	.176	.193	.191	.837	1.195
	PEQ07	.032	.023	.198	1.365	.174	-.014	.078	.031	.094	.092	.215	4.645
	PEQ08	-.049	.026	-.278	-1.919	.056	-.100	.001	-.025	-.132	-.129	.216	4.627
	PEQ09	-.084	.075	-.076	-1.121	.264	-.231	.064	-.074	-.078	-.076	.998	1.002

a Dependent Variable: CSW_AC

b. Work-based Stressors - Planning

The standard regression analysis exploring the question how well do the various components of project management culture predict the use of Planning with work-based stressors returned an R = .285 and R^2= .081. The model was statistically significant (.001). The model explains 8.1% of the variance in Planning scores for work-based stressors. A detailed analysis reveals that PEQ07, number of years working in project management is the greatest contributor to variation followed by CQSUM both are statistically significant contributors to the variance. The detailed coefficients are shown in Table 65 below.

Table 65 - Regression Coefficients - PM Culture - Work-based Stressors - Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	5.792	.495		11.711	.000	4.817	6.767					
	CQSUM	.068	.022	.223	3.064	.002	.024	.111	.226	.208	.204	.837	1.195
	PEQ07	.044	.021	.294	2.054	.041	.002	.086	.129	.141	.137	.215	4.645
	PEQ08	-.046	.024	-.281	-1.965	.051	-.093	.000	.061	-.135	-.131	.216	4.627
	PEQ09	-.109	.069	-.105	-1.585	.115	-.244	.027	-.099	-.109	-.105	.998	1.002

a Dependent Variable: CSW_P

c. Work-based Stressors - Use of Instrumental Support

The standard regression model for Use of Instrumental Support was not statistically valid.

d. Home-based Stressor - Active Coping

The standard regression analysis exploring the question how well do the various components of project management culture predict the use of Active Coping with home-based stressors returned an R = .250 and R^2= .063. The model was statistically significant (.009). The model explains 6.3% of the variance in Active Coping scores for home-based stressors which is similar to the predictability found for Active Coping for work-based stressors. A detailed analysis reveals that only CQSUM is the only statistically significant contributor to the variance. The detailed coefficients are shown in Table 66 below.

Table 66 - Regression Coefficients - PM Culture - Home-based Stressors - Active Coping

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	3.517	.748		4.703	.000	2.043	4.991					
	CQSUM	.099	.033	.218	2.976	.003	.034	.165	.180	.202	.200	.837	1.195
	PEQ07	.038	.032	.170	1.172	.243	-.026	.102	.016	.081	.079	.215	4.645
	PEQ08	-.068	.036	-.276	-1.915	.057	-.138	.002	-.037	-.132	-.129	.216	4.627
	PEQ09	.157	.104	.102	1.515	.131	-.047	.361	.103	.104	.102	.998	1.002

a Dependent Variable: CSH_AC

e. Home-based Stressor - Planning

The standard regression analysis exploring the question how well do the various components of project management culture predict the use of Planning with home-based stressors returned an R = .289 and R^2= .084. The model was statistically significant (.001). The model explains 8.4% of the variance in Planning scores for home-based stressors which is similar to the predictability found for Active Coping for work-based stressors. A detailed analysis reveals that CQSUM is the greatest contributor to variation followed by PEQ08, number of years working as a project manager. Both are statistically significant contributors to the variance. The detailed coefficients are shown in Table 67 below.

Table 67 - Regression Coefficients - PM Culture - Home-based Stressors - Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	4.621	.720		6.415	.000	3.201	6.041					
	CQSUM	.106	.032	.240	3.303	.001	.043	.170	.162	.223	.219	.837	1.195
	PEQ07	.047	.031	.213	1.491	.138	-.015	.108	-.058	.103	.099	.215	4.645
	PEQ08	-.099	.034	-.410	-2.871	.005	-.166	-.031	-.131	-.195	-.191	.216	4.627
	PEQ09	-.088	.100	-.059	-.885	.377	-.285	.108	-.062	-.061	-.059	.998	1.002

a Dependent Variable: CSH_P

f. Home-based Stressor - Use of Instrumental Support

The standard regression model for Use of Instrumental Support was not statistically valid.

g. Personal Health Stressors

The standard regression models for Active Coping, Planning and Use of Instrumental Support were not statistically valid.

The standard regression analyses confirm the elements of project management culture as defined in this study for duration of experience and perceived organisational project management maturity are not significant contributors to the variance in use of problem-solving coping strategies. There is some predictability based on individual project management competence for the use of Planning and Active Coping with small percentages of the variance in usage for work and home-based stressors being predicted by CQSUM scores. No predictability was found for personal health stressors. These results partially support hypothesis H12, that project management culture predicts the use of Active Coping

and Planning across all three (3) domains of work, home and personal health. The following two sets of standard regression models take the individual project management competency component of project management culture and explore in more detail the predictive ability of the sub-scales within CQSUM with regards to use of Active Coping, Planning and Use of Instrumental Support.

2. Individual Project Management Culture Model

A standard regression was run for each of the nine (9) dependent variables listed below using the six (6) independent variables for individual project management competence.

Dependent Variable: Coping Strategy (CSW_AC, CSW_P, CSW_UIS, CSH_AC, CSH_P, CSH_UIS, CSP_AC, CSP_P, CSP_UIS)
Independent Variables: CQ1 – CQ6

a. Work-based Stressor - Active Coping

The standard regression analysis exploring the question 'how well do the sub-scales of the individual project management competence measure predict the use of Active Coping with work-based stressors?' returned an R = .320 and R^2= .102. The model was statistically significant (.001). The model explains 10.2% of the variance in Active Coping scores for work-based stressors. A detailed analysis reveals that only subscale CQ02 (Manage the development of the plan for the project) is a significant contributors. The detailed coefficients are shown in Table 68 below.

Table 68 - Regression Coefficients - Individual PM Competence - Work-based Stressors - Active Coping

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	5.720	.530		10.795	.000	4.675	6.764					
	CQ1	.012	.206	.006	.057	.955	-.395	.419	.172	.004	.004	.372	2.687
	CQ2	.918	.252	.468	3.648	.000	.422	1.415	.251	.245	.240	.263	3.806
	CQ3	-.315	.243	-.167	-1.296	.197	-.794	.164	.121	-.089	-.085	.261	3.832
	CQ4	-.355	.174	-.219	-2.040	.043	-.699	-.012	.060	-.140	-.134	.376	2.658
	CQ5	.043	.184	.026	.235	.814	-.319	.405	.145	.016	.015	.342	2.926
	CQ6	.099	.117	.080	.849	.397	-.131	.330	.162	.059	.056	.489	2.044

a Dependent Variable: CSW_AC

b. Work-based Stressor - Planning

The standard regression analysis exploring the question 'how well do the sub-scales of the individual project management competence measure predict the use of Planning with work-based stressors?' returned an R = .288 and R^2= .083. The model was statistically significant (.006). The model explains 8.3% of the variance in Planning scores for work-based stressors. A detailed analysis reveals that only subscale CQ02 (Manage the development of the plan for the project) is a significant contributor explaining 6.3% of the variance independent of the other variables. The detailed coefficients are shown in Table 69 below.

Table 69 - Regression Coefficients - Individual PM Competence - Work-based Stressors - Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	5.578	.498		11.207	.000	4.596	6.559					
	CQ1	-.051	.194	-.029	-.265	.791	-.434	.331	.178	-.018	-.018	.372	2.687
	CQ2	.506	.236	.277	2.140	.034	.040	.972	.251	.147	.142	.263	3.806
	CQ3	.103	.228	.059	.451	.653	-.347	.553	.212	.031	.030	.261	3.832
	CQ4	-.245	.164	-.162	-1.496	.136	-.568	.078	.119	-.103	-.099	.376	2.658
	CQ5	-.030	.173	-.020	-.173	.862	-.370	.310	.169	-.012	-.012	.342	2.926
	CQ6	.147	.110	.127	1.341	.181	-.069	.364	.226	.093	.089	.489	2.044

a Dependent Variable: CSW_P

c. Work-based Stressor - Use of Instrumental Support

The standard regression model for Use of Instrumental Support was not statistically valid.

d. Home-based Stressor - Active Coping

The standard regression analysis exploring the question how well do the sub-scales of the individual project management competence measure predict the use of Active Coping with home-based stressors returned an R = .257 and R^2= .066. The model was statistically significant (.027). The model explains 6.6% of the variance in Active Coping scores for home-based stressors. A detailed analysis reveals that only subscale CQ04 (Manage product acceptance) is a significant contributor however its contribution is minimal explaining less than 1% of the variance independent of the other variables. The detailed coefficients are shown in Table 70 below.

Table 70 - Regression Coefficients - Individual PM Competence - Home-based Stressors - Active Coping

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	4.037	.752		5.369	.000	2.554	5.519					
	CQ1	.090	.293	.034	.307	.759	-.487	.668	.172	.021	.021	.372	2.687
	CQ2	.455	.357	.166	1.273	.204	-.249	1.159	.194	.088	.085	.263	3.806
	CQ3	.410	.345	.156	1.190	.236	-.270	1.090	.188	.082	.080	.261	3.832
	CQ4	-.561	.247	-.248	-2.268	.024	-1.048	-.073	.060	-.155	-.152	.376	2.658
	CQ5	.105	.261	.046	.403	.688	-.409	.619	.154	.028	.027	.342	2.926
	CQ6	.066	.166	.038	.400	.690	-.261	.393	.163	.028	.027	.489	2.044

a Dependent Variable: CSH_AC

e. Home-based Stressor – Planning

The standard regression analysis exploring the question how well do the sub-scales of the individual project management competence measure predict the use of Planning with home-based stressors returned an R = .250 and R^2= .062. The model was statistically significant (.035). The model explains 6.2% of the variance in Planning scores for home-based stressors. A detailed analysis reveals that only subscale CQ03 (Manage project progress) is a significant contributor. The detailed coefficients are shown in Table 71 below.

Table 71 - Regression Coefficients - Individual PM Competence - Home-based Stressors - Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	4.495	.734		6.125	.000	3.048	5.942					
	CQ1	.297	.286	.114	1.040	.300	-.266	.861	.173	.072	.070	.372	2.687
	CQ2	-.066	.349	-.025	-.190	.850	-.754	.621	.144	-.013	-.013	.263	3.806
	CQ3	.745	.337	.291	2.211	.028	.081	1.408	.199	.152	.148	.261	3.832
	CQ4	-.454	.241	-.206	-1.881	.061	-.930	.022	.059	-.129	-.126	.376	2.658
	CQ5	-.030	.254	-.013	-.117	.907	-.532	.472	.126	-.008	-.008	.342	2.926
	CQ6	.027	.162	.016	.166	.868	-.292	.346	.141	.012	.011	.489	2.044

a Dependent Variable: CSH_P

f. Home-based Stressor - Use of Instrumental Support

The standard regression model for Use of Instrumental Support was not statistically valid.

g. Personal Health Stressor - Active Coping

The standard regression model for Active Coping was not statistically valid.

h. Personal Health Stressor – Planning

The standard regression analysis exploring the question how well do the sub-scales of the individual project management competence measure predict the use of Planning with personal health stressors returned an R = .298 and R^2= .089. The model was statistically significant (.011). The model explains 8.9% of the variance in Planning scores for personal health stressors. A detailed analysis reveals that only subscale CQ04

(Manage product acceptance) is a significant contributor however its contribution is minimal explaining less than 1% of the variance independent of the other variables. The detailed coefficients are shown in Table 72 below.

Table 72 - Regression Coefficients - Individual PM Competence - Personal Health Stressors - Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	B	Std. Error
1	(Constant)	3.879	.893		4.342	.000	2.116	5.643					
	CQ1	.046	.348	.016	.133	.894	-.641	.733	.169	.010	.010	.372	2.687
	CQ2	.301	.424	.099	.709	.479	-.537	1.139	.170	.053	.051	.263	3.806
	CQ3	.440	.410	.151	1.072	.285	-.369	1.249	.176	.080	.077	.261	3.832
	CQ4	-.859	.294	-.342	-2.923	.004	-1.439	-.279	.026	-.215	-.210	.376	2.658
	CQ5	.548	.310	.217	1.770	.078	-.063	1.160	.201	.132	.127	.342	2.926
	CQ6	.091	.197	.048	.464	.643	-.297	.480	.173	.035	.033	.489	2.044

a Dependent Variable: CSP_P

i. Personal Health Stressor - Use of Instrumental Support

The standard regression model for Use of Instrumental Support was not statistically valid.

Overall the regression analyses are weak showing limited predictive value of the individual sub-scales of individual competence on coping strategy selection across the three (3) domains of work, home and personal health stressors. However, the sub-scale CQ02, manage the development to the plan for the project, the most planning dominated sub-scale is a predictor of the use of Active Coping and Planning in dealing with work-based stressors.

6.2.10 Predictability of perceived control and primary appraisals by project management culture

Hypothesis H13 posits that project management culture will be a predictor of a higher sense of perceived control over specific events and "challenge" appraisals for stressful events at work, home and with personal health issues. The univariate and correlation analysis reported above indicate that this hypothesis is weak. To confirm, standard regression models were applied for each of the six (6) dependent variables below with the four (4) independent variables taken from the measures for project management culture of duration, perceived organisational maturity and individual project management competence.

Dependent: CSW05, CSH05, CSP05, CSW05, CSH06, CSP06
Independent: PEQ07, PEQ08, PEQ09, CQSUM

Each of the models was found to not be statistically significant. No predictions can be made about perceived control or primary appraisals of specific stressful events as a result of project management culture as defined in this study.

Further analysis was planned for the sub-scales of the CQSUM measure. Due to the failure of the regression model described above to determine any statistically significant relationship between CQSUM and the independent variables this analysis was not conducted.

6.2.11 Summary of Regression Analysis

The regression analysis exploring the predictability of coping strategy selection based on the three (3) measures of control (perceived control, primary appraisal, GSE) partially supported hypothesis H08 that GSE as a predictor of coping strategy selection and disproved hypothesis H09 that the all three (3) measures of control would be predictive of coping strategy selection for problem-focused coping strategies specifically, Active Coping and Planning. Although each of the factors was found to be predictive in some cases the variations explained were very small, too small to draw generalisable conclusions.

GSE was found to contribute significantly to the variance in the use of Active Coping, Positive Reframing and Acceptance with work-based stressors, Acceptance with home-based stressors and Planning with personal health stressors. These results partially support hypothesis H08.

Hypothesis H12 was partially supported with respect to the predictive nature of coping strategies based on individual project management competence. However as with control the variances explained are small and not strong enough to be conclusive or generalisable. Individual project management competence was found to significantly contribute to the variation in Active Coping and Planning with both work and home-based stressors. Exploration of the predictive value of the sub-scales of the individual project management competence measure CQSUM revealed limited predictive ability of the sub-scales.

6.3 Analysis of Variance (ANOVA & T-Test)

6.3.1 Analysis of the variance in dispositional use of coping strategies

Hypothesis H01 proposes that project manager use more problem-focused coping strategies, specifically Active Coping and Planning, than emotion-focused coping when dealing with stressful situation in general. The univariate analysis has shown the mean scores for Active Coping and Planning to be the highest and most used strategies by project managers when coping with stress generally. A one-way repeated measure ANOVA was conducted to explore the nature of differences in means across the fourteen (14) scoping strategies. The one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping

strategies scales CS_SD, CS_AC, CS_D, CS_SU, CS_UES, CS_UIS, CS_BD, CS_V, CS_PR, CS_P, CS_H, CS_A, CS_R, CS_SB. The mean and standard deviations are presented in Table 73 below. The multivariate test results (which are not reliant on sphericity) show that there is a significant difference in the means across the fourteen (14) measures (Wilks' Lambda = .030, F (13, 66) =164.401, p<.0005, multivariate partial eta squared=.970) Mauchly's test indicates that the assumption of sphericity has been violated (chi-square = 590.23, p <.05), therefore the degrees of freedom are corrected using Greenhouse-Geisser estimates of sphericity (epsilon = 0.728). The results show that the coping strategy scores of the fourteen (14) strategies differ significantly, F (9.467, 2025.987) = 283.699, p <.05. Post hoc tests using Bonferroni reveal that there is no statistical difference in the means for Active Coping and Planning. Active Coping and Planning are used significantly more than all other types of coping.

Table 73 - Descriptive Statistics for Dispositional Coping Strategy Scores

	Mean	Std. Deviation	N
CS_SD	4.43	1.429	79
CS_AC	7.23	.876	79
CS_D	2.44	.797	79
CS_SU	2.32	.760	79
CS_UE	4.58	1.598	79
CS_UI	6.03	1.271	79
CS_BD	2.43	.929	79
CS_V	4.20	1.497	79
CS_PR	6.05	1.348	79
CS_P	7.01	1.204	79
CS_H	4.18	1.534	79
CS_A	6.03	1.330	79
CS_R	3.54	2.018	79
CS_SB	4.25	1.605	79

Table 74 - Multivariate Tests for Dispositional Coping Strategy Scores

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
dispositional_coping	Pillai's Trace	.970	164.401(a)	13.000	66.000	.000	.970
	Wilks' Lambda	.030	164.401(a)	13.000	66.000	.000	.970
	Hotelling's Trace	32.382	164.401(a)	13.000	66.000	.000	.970
	Roy's Largest Root	32.382	164.401(a)	13.000	66.000	.000	.970

a Exact statistic
b Design: Intercept
Within Subjects Design: dispositional_coping

Table 75 - Tests of Within-Subjects Effects for Dispositional Coping Strategy Scores

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Dispositional coping	Sphericity Assumed	2769.853	13	213.066	134.819	.000	.633
	Greenhouse-Geisser	2769.853	8.276	334.679	134.819	.000	.633
	Huynh-Feldt	2769.853	9.349	296.287	134.819	.000	.633
	Lower-bound	2769.853	1.000	2769.853	134.819	.000	.633
Error (dispositional coping)	Sphericity Assumed	1602.505	1014	1.580			
	Greenhouse-Geisser	1602.505	645.540	2.482			
	Huynh-Feldt	1602.505	729.186	2.198			
	Lower-bound	1602.505	78.000	20.545			

6.3.2 Analysis of the variance in use of coping strategies across domains

Hypothesis H02 discussed in section 7.1.3 above, proposes that project managers use more problem-focused coping strategies, specifically Active Coping and Planning, than emotion-focused coping across the three (3) domains of work, home and personal health. The descriptive statistics revealed a greater use of Active Coping and Planning across all three (3) domains by project managers than all other coping strategies for dealing with work-based stressors and all other coping strategies other than Acceptance for home and personal health stressors. To explore this finding further a series of repeated measure ANOVAs was conducted. The first set explored the three questions

1. "Are there differences in scores across the fourteen (14) coping strategies applied by respondents when dealing with stress at work?
2. "Are there differences in scores across the fourteen (14) coping strategies applied by respondents when dealing with stress at home?
3. "Are there differences in scores across the fourteen (14) coping strategies applied by respondents when dealing with stress associated with personal health?

a. Repeated Measure ANOVA – Work-based Stressor

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSW_SD, CSW_AC, CSW_D, CSW_SU, CSW_UES, CSW_UIS, CSW_BD, CSW_V, CSW_PR, CSW_P, CSW_H, CSW_A, CSW_R, CSW_SB. The mean and standard deviations are

presented in Table 76 below. The multivariate test results (which are not reliant on sphericity) show that there is a significant difference in the means across the fourteen (14) measures (Wilks' Lambda = .082, F (13,202) =174.35, p<.0005, multivariate partial eta squared=.918) Mauchly's test indicates that the assumption of sphericity has been violated (chi-square = 590.23, p <.05), therefore the degrees of freedom are corrected using Greenhouse-Geisser estimates of sphericity (epsilon = 0.728). The results show that the coping strategy scores of the fourteen (14) strategies differ significantly, F (9.467, 2025.987) = 282.392, p <.05. Post hoc tests using Bonferroni reveal that there is no statistical difference in the means for Active Coping and Planning. Active Coping and Planning are used significantly more than all other types of coping.

Table 76 - Descriptive Statistics for Coping Strategy Scores for Coping with Work Stressors

	Mean	Std. Deviation	N
CSW_SD	4.3628	1.62012	215
CSW_AC	7.0698	1.31837	215
CSW_D	2.5907	1.11904	215
CSW_SU	2.4419	.91973	215
CSW_UES	4.5395	1.74470	215
CSW_UIS	5.5628	1.74402	215
CSW_BD	2.4372	.92953	215
CSW_V	4.2651	1.54963	215
CSW_PR	5.2791	1.72564	215
CSW_P	7.0558	1.22537	215
CSW_H	4.5581	1.84824	215
CSW_A	6.2558	1.53302	215
CSW_R	3.1767	1.82055	215
CSW_SB	3.2651	1.47548	215

Table 77 - Multivariate Tests for Coping Strategy Scores for Coping with Work Stressors

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Coping Work	Pillai's Trace	.918	174.354(a)	13.000	202.000	.000	.918
	Wilks' Lambda	.082	174.354(a)	13.000	202.000	.000	.918
	Hotelling's Trace	11.221	174.354(a)	13.000	202.000	.000	.918
	Roy's Largest Root	11.221	174.354(a)	13.000	202.000	.000	.918

a Exact statistic
b Design: Intercept
Within Subjects Design: Coping_Work

Table 78 - Tests of Within-Subjects Effects for Coping Strategy Scores for Coping with Work Stressors

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Coping Work	Sphericity Assumed	7190.722	13	553.132	282.392	.000	.569
	Greenhouse-Geisser	7190.722	9.467	759.538	282.392	.000	.569
	Huynh-Feldt	7190.722	9.942	723.271	282.392	.000	.569
	Lower-bound	7190.722	1.000	7190.722	282.392	.000	.569
Error (Coping Work)	Sphericity Assumed	5449.207	2782	1.959			
	Greenhouse-Geisser	5449.207	2025.987	2.690			
	Huynh-Feldt	5449.207	2127.577	2.561			
	Lower-bound	5449.207	214.000	25.464			

b. Repeated Measure ANOVA – Home-based Stressor

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSH_SD, CSH_AC, CSH_D, CSH_SU, CSH_UES, CSH_UIS, CSH_BD, CSH_V, CSH_PR, CSH_P, CSH_H, CSH_A, CSH_R, CSH_SB. The mean and standard deviations are presented in Table 79 below. The multivariate test results (which are not reliant on sphericity) show that there is a significant difference in the means across the fourteen (14) measures (Wilks' Lambda = .152, F (13,202) =86.694, p<.0005, multivariate partial eta squared=.848) Mauchly's test indicates that the assumption of sphericity has been violated (chi-square = 553.265, p <.05), therefore the degrees of freedom are corrected using Greenhouse-Geisser estimates of sphericity (epsilon = 0.704). The results show that the coping strategy scores of the fourteen (14) strategies differ significantly, F (9.158, 2054.869) = 282.392, p <.05. Post hoc tests using Bonferroni reveal that there is no statistical difference in the means for Active Coping, Planning and Acceptance. Active Coping, Planning and Acceptance are all used significantly more than all other types of coping.

Table 79 - Descriptive Statistics for Coping Strategy Scores for Coping with Home Stressors

	Mean	Std. Deviation	N
CSH_SD	4.5721	1.91969	215
CSH_AC	5.9721	1.83404	215
CSH_D	2.7256	1.23578	215
CSH_SU	2.6093	1.24402	215
CSH_UES	4.7721	2.06419	215
CSH_UIS	4.8744	2.06394	215
CSH_BD	2.8093	1.28467	215
CSH_V	4.0186	1.74806	215
CSH_PR	5.0047	2.02669	215
CSH_P	6.3023	1.78696	215
CSH_H	3.6093	1.94934	215
CSH_A	6.1256	1.81583	215
CSH_R	3.3628	2.04357	215
CSH_SB	3.2651	1.65463	215

Table 80 - Multivariate Tests for Coping Strategy Scores for Coping with Home Stressors

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Coping Home	Pillai's Trace	.848	86.694(a)	13.000	202.000	.000	.848
	Wilks' Lambda	.152	86.694(a)	13.000	202.000	.000	.848
	Hotelling's Trace	5.579	86.694(a)	13.000	202.000	.000	.848
	Roy's Largest Root	5.579	86.694(a)	13.000	202.000	.000	.848

a Exact statistic
b Design: Intercept
Within Subjects Design: Coping_Home

Table 81 - Tests of Within-Subjects Effects for Coping Strategy Scores for Coping with Home Stressors

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Coping Home	Sphericity Assumed	4584.690	13	352.668	128.603	.000	.375
	Greenhouse-Geisser	4584.690	9.158	500.631	128.603	.000	.375
	Huynh-Feldt	4584.690	9.602	477.463	128.603	.000	.375
	Lower-bound	4584.690	1.000	4584.690	128.603	.000	.375
Error (Coping Home)	Sphericity Assumed	7629.096	2782	2.742			
	Greenhouse-Geisser	7629.096	1959.776	3.893			
	Huynh-Feldt	7629.096	2054.869	3.713			
	Lower-bound	7629.096	214.000	35.650			

c. Repeated Measure ANOVA – Personal Health Stressor

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSP_SD, CSP_AC, CSP_D, CSP_SU, CSP_UES, CSP_UIS, CSP_BD, CSP_V, CSP_PR, CSP_P, CSP_H, CSP_A, CSP_R, CSP_SB. The mean and standard deviations are presented in Table 82 below. The multivariate test results (which are not reliant on sphericity) shows that there is a significant difference in the means across the fourteen (14) measures (Wilks' Lambda = .198, F (13,161) =50.265, p<.0005, multivariate partial eta squared=.802) Mauchly's test indicates that the assumption of sphericity has been violated (chi-square = 403.819, p <.05), therefore the degrees of freedom are corrected using Greenhouse-Geisser estimates of sphericity (epsilon = 0.677). The results show that the coping strategy scores of the fourteen (14) strategies differ significantly, F (8.801, 1522.629) = 93.598, p <.05. Post hoc tests using Bonferroni reveal that there is no statistical difference in the means for Active Coping, Planning and Acceptance. There is also no statistical difference in the means for Planning and Use of Instrumental Support. However Active Coping and Acceptance are used more frequently than Instrumental Support. Active Coping, Planning and Acceptance are all used significantly more than all other types of coping.

Table 82 - Descriptive Statistics for Coping Strategy Scores for Coping with Personal Health Stressors

	Mean	Std. Deviation	N
CSP_SD	4.2184	1.85563	174
CSP_AC	5.9540	1.97035	174
CSP_D	2.6724	1.24540	174
CSP_SU	2.6552	1.48851	174
CSP_UES	4.6954	1.99255	174
CSP_UIS	5.1437	2.28517	174
CSP_BD	2.6494	1.19637	174
CSP_V	3.4253	1.59937	174
CSP_PR	3.9943	2.10833	174
CSP_P	5.6494	2.04518	174
CSP_H	3.6782	2.01437	174
CSP_A	5.8218	1.94947	174
CSP_R	3.0575	1.78857	174
CSP_SB	3.4540	1.91002	174

Table 83 - Multivariate Tests for Coping Strategy Scores for Coping with Personal Health Stressors

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Coping PersonalHealth	Pillai's Trace	.802	50.265(a)	13.000	161.000	.000	.802
	Wilks' Lambda	.198	50.265(a)	13.000	161.000	.000	.802
	Hotelling's Trace	4.059	50.265(a)	13.000	161.000	.000	.802
	Roy's Largest Root	4.059	50.265(a)	13.000	161.000	.000	.802

a Exact statistic
b Design: Intercept
Within Subjects Design: Coping_PersonalHealth

Table 84 - Tests of Within-Subjects Effects for Coping Strategy Scores for Coping with Personal Health Stressors

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Coping PersonalHealth	Sphericity Assumed	3241.798	13	249.369	93.598	.000	.351
	Greenhouse-Geisser	3241.798	8.801	368.331	93.598	.000	.351
	Huynh-Feldt	3241.798	9.315	348.037	93.598	.000	.351
	Lower-bound	3241.798	1.000	3241.798	93.598	.000	.351
Error(Coping PersonalHealth)	Sphericity Assumed	5991.916	2249	2.664			
	Greenhouse-Geisser	5991.916	1522.629	3.935			
	Huynh-Feldt	5991.916	1611.411	3.718			
	Lower-bound	5991.916	173.000	34.635			

These results establish that project managers use more Active Coping, Planning and Acceptance than other forms of coping across all three (3) domains. The following analysis explores the relative degree of usage of these three (3) coping strategies across the three (3) domains of work, home and personal health. The second set of repeated measure ANOVAs explores the questions

1. Are there any differences in the use of Active Coping across the three (3) domains of work, home and personal health?
2. Are there any differences in the use of Planning across the three (3) domains of work, home and personal health?
3. Are there any differences in the use of Acceptance across the three (3) domains of work, home and personal health?

d. Repeated Measure ANOVA – Active Coping

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSW_AC, CSH_AC and CSP_AC. The mean and standard deviations are presented in Table 85 below. The multivariate test results (which are not reliant on sphericity) show that there is a significant difference in the mean scores for use of Active Coping across the three (3) domains. (Wilks' Lambda = .754, F (2,184) =29.956, p<.0005, multivariate partial eta squared=.246) Mauchly's test indicated that the assumption of sphericity has not been violated (chi-square = 2.009, p >.05), therefore sphericity is assumed. The results show that the Active Coping scores differ significantly, F (2,370) = 28.184, p <.05. Post hoc tests using Bonferroni reveal that there is no statistical difference in the means for use of Active Coping at home and with personal health stressors. However there is a significantly greater use of Active Coping with work-based stressors than either home or personal health stressors.

Table 85 - Descriptive Statistics for use of Active Coping across Work, Home and Personal Health Domains

	Mean	Std. Deviation	N
CSW_AC	7.0376	1.30847	186
CSH_AC	6.0215	1.79476	186
CSP_AC	6.0269	1.94917	186

Table 86 - Multivariate Tests for use of Active Coping across Work, Home and Personal Health Domains

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Active_Coping	Pillai's Trace	.246	29.956(a)	2.000	184.000	.000	.246
	Wilks' Lambda	.754	29.956(a)	2.000	184.000	.000	.246
	Hotelling's Trace	.326	29.956(a)	2.000	184.000	.000	.246
	Roy's Largest Root	.326	29.956(a)	2.000	184.000	.000	.246

a Exact statistic
b Design: Intercept
Within Subjects Design: Active_Coping

Table 87 - Tests of Within-Subjects Effects for use of Active Coping across Work, Home and Personal Health Domains

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Active Coping	Sphericity Assumed	127.358	2	63.679	28.184	.000	.132
	Greenhouse-Geisser	127.358	1.979	64.371	28.184	.000	.132
	Huynh-Feldt	127.358	2.000	63.686	28.184	.000	.132
	Lower-bound	127.358	1.000	127.358	28.184	.000	.132
Error (Active Coping)	Sphericity Assumed	835.975	370	2.259			
	Greenhouse-Geisser	835.975	366.025	2.284			
	Huynh-Feldt	835.975	369.960	2.260			
	Lower-bound	835.975	185.000	4.519			

e. Repeated Measure ANOVA – Planning

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSW_P, CSH_P and CSP_P. The mean and standard deviations are presented in Table 88 below. The multivariate test results (which are not reliant on sphericity) show that there is a significant difference in the mean scores for use of Planning across the three (3) domains. (Wilks' Lambda = .692, F (2,184) =40.524, p<.0005, multivariate partial eta squared=.308) Mauchly's test indicated that the assumption of sphericity has been violated (chi-square = 10.805, p <.05), therefore the degrees of freedom are corrected using Huynh-Feldt estimates of sphericity (epsilon = 0.945). The results show that the Planning scores differ significantly, F (1.910, 349.556) = 85.001, p <.05. Post hoc tests using Bonferroni reveal that there is a statistical difference in the means for use of Planning at work compared to the use of Planning at home and with personal health stressors. Planning is used more frequently at work than at home or with personal health issues. Planning is also used more frequently at home than with personal health issues.

Table 88 - Descriptive Statistics for use of Planning across Work, Home and Personal Health Domains

	Mean	Std. Deviation	N
CSW_P	7.0598	1.21093	184
CSH_P	6.3370	1.74166	184
CSP_P	5.7283	2.03576	184

Table 89 - Multivariate Tests for use of Planning across Work, Home and Personal Health Domains

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Planning	Pillai's Trace	.308	40.524(a)	2.000	182.000	.000	.308
	Wilks' Lambda	.692	40.524(a)	2.000	182.000	.000	.308
	Hotelling's Trace	.445	40.524(a)	2.000	182.000	.000	.308
	Roy's Largest Root	.445	40.524(a)	2.000	182.000	.000	.308

a Exact statistic
b Design: Intercept
Within Subjects Design: Planning

Table 90 - Tests of Within-Subjects Effects for use of Planning across Work, Home and Personal Health Domains

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Planning	Sphericity Assumed	163.511	2	81.755	39.278	.000	.177
	Greenhouse-Geisser	163.511	1.891	86.468	39.278	.000	.177
	Huynh-Feldt	163.511	1.910	85.601	39.278	.000	.177
	Lower-bound	163.511	1.000	163.511	39.278	.000	.177
Error (Planning)	Sphericity Assumed	761.822	366	2.081			
	Greenhouse-Geisser	761.822	346.053	2.201			
	Huynh-Feldt	761.822	349.556	2.179			
	Lower-bound	761.822	183.000	4.163			

f. Repeated Measure ANOVA – Acceptance

A one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare scores on the coping strategies scales CSW_A, CSH_A and CSP_A. The mean and standard deviations are presented in Table 91 below. The multivariate test results (which are not reliant on sphericity) show that there is a small but significant difference in the mean scores for use of Acceptance across the three (3) domains. (Wilks' Lambda = .952, F (2,184) = 4.650, $p<.05$, multivariate partial eta squared=.0.048) Post hoc tests using Bonferroni reveal that there is no statistically significant difference in the means for Acceptance with work or with home-based stressors; however Acceptance is used more frequently with work-based stressors than personal health stressors.

Table 91 - Descriptive Statistics

	Mean	Std. Deviation	N
CSW_A	6.3333	1.45441	186
CSH_A	6.1989	1.78831	186
CSP_A	5.8548	1.91026	186

Table 92 - Multivariate Tests for use of Acceptance across Work, Home and Personal Health Domains

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Acceptance	Pillai's Trace	.048	4.650(a)	2.000	184.000	.011	.048
	Wilks' Lambda	.952	4.650(a)	2.000	184.000	.011	.048
	Hotelling's Trace	.051	4.650(a)	2.000	184.000	.011	.048
	Roy's Largest Root	.051	4.650(a)	2.000	184.000	.011	.048

a Exact statistic
b Design: Intercept
Within Subjects Design: Acceptance

Table 93 - Tests of Within-Subjects Effects for use of Acceptance across Work, Home and Personal Health Domains

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Acceptance	Sphericity Assumed	22.656	2	11.328	5.136	.006	.027
	Greenhouse-Geisser	22.656	1.975	11.469	5.136	.007	.027
	Huynh-Feldt	22.656	1.997	11.347	5.136	.006	.027
	Lower-bound	22.656	1.000	22.656	5.136	.025	.027
Error (Acceptance)	Sphericity Assumed	816.011	370	2.205			
	Greenhouse-Geisser	816.011	365.456	2.233			
	Huynh-Feldt	816.011	369.375	2.209			
	Lower-bound	816.011	185.000	4.411			

6.3.3 Analysis of variance in primary appraisal of stressful situations across domains

Hypothesis H03 predicts that project managers will appraise stressful situations at work, home and with their personal health as "challenges" rather than "threats". Primary appraisal was measured using a single item with respondents being asked to rate each stressful situation they described on a 5-point Likert scale from threat to challenge. This hypothesis is derived from the literature review which suggests that individuals with a greater sense of control tend to view stressful events as challenges to be overcome and therefore use more Planning and Active Coping to tackle a surmountable problem. The mean scores are shown in Table 94 below. Contrary to the hypothesis project managers do not rate stressful situations as "challenges" more often than "threats" enough to support hypothesis H03, with the means tending only slightly above 2.5 out of a possible 5, with work-based stressors being considered more

challenges than stressful situations in the other two (2) domains. Further analysis is conducted using a repeated measure ANOVA to identify any significant variances in the means for each domain.

Table 94 - Descriptive Statistics for Primary Appraisals of Stressors across Work, Home and Personal Health Domains

	Mean	Std. Deviation	N
CSW05	3.08	1.317	185
CSH05	2.91	1.318	185
CSP05	2.51	1.277	185

The one-way repeated measure ANOVA was conducted using SPPS V15.0 Graduate Version to compare means of the primary appraisal scores CSW05, CSH05 and CSP05. The Mauchly's test for sphericity is not significant therefore sphericity can be assumed. The multivariate test results (which are not reliant on sphericity) show that there is a large and significant difference in the mean scores for primary appraisal across the three (3) domains. (Wilks' Lambda = .908, F (2,183) = 9.259, p<.0005, multivariate partial eta squared=.0.092) Post hoc tests using Bonferroni reveal that there is no statistically significant difference in the means for primary appraisal with work or home-based stressors; however there is a significant difference between both work and home appraisals and personal health stressor appraisals with personal health stressors being rated as threats more frequently than either work or home-based stressors.

Table 95 - Multivariate Tests for Primary Appraisals of Stressors across Work, Home and Personal Health Domains

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Primary_Appraisal	Pillai's Trace	.092	9.259(a)	2.000	183.000	.000	.092
	Wilks' Lambda	.908	9.259(a)	2.000	183.000	.000	.092
	Hotelling's Trace	.101	9.259(a)	2.000	183.000	.000	.092
	Roy's Largest Root	.101	9.259(a)	2.000	183.000	.000	.092

a Exact statistic
b Design: Intercept
Within Subjects Design: Primary_Appraisal

Table 96 - Tests of Within-Subjects Effects for Primary Appraisals of Stressors across Work, Home and Personal Health Domains

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Primary Appraisal	Sphericity Assumed	30.822	2	15.411	9.725	.000	.050
	Greenhouse-Geisser	30.822	1.972	15.628	9.725	.000	.050
	Huynh-Feldt	30.822	1.993	15.462	9.725	.000	.050
	Lower-bound	30.822	1.000	30.822	9.725	.002	.050
Error (Primary Appraisal)	Sphericity Assumed	583.178	368	1.585			
	Greenhouse-Geisser	583.178	362.888	1.607			
	Huynh-Feldt	583.178	366.791	1.590			
	Lower-bound	583.178	184.000	3.169			

6.3.4 Analysis of variance of perceived control ratings of stressful situations across domains

Hypothesis H04 predicts that project managers appraise stressful situations as "amenable to change" more frequently than "uncontrollable" across all three (3) domains. The descriptive statistics reported in section 7.1.3 show that there is a tendency for project managers to rate their stressful situations as neither controllable nor uncontrollable with means ranging from 2.5 to 2.62 out of a possible 5 for all three (3) domains. Surprisingly work-based stressors rated the lowest and personal health the highest (i.e. the most controllable/amenable to change). This result contradicts the hypothesis, H04. Further analysis is conducted using a repeated measure ANOVA to ascertain whether there are any statistically significant variances in the means between work, home and personal health stressor appraisals of control. The summary statistics are shown in Tables 93-95 below. The results show that there are no statistically significant variances between the appraisals of perceived control across work, home and personal health stressors.

Table 97 - Descriptive Statistics for Perceived Control of Stressors across Work, Home and Personal Health Domains

	Mean	Std. Deviation	N
CSW06	2.50	1.218	186
CSH06	2.58	1.310	186
CSP06	2.62	1.395	186

Table 98 - Multivariate Tests for Perceived Control of Stressors across Work, Home and Personal Health Domains

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Perceived Control	Pillai's Trace	.005	.434(a)	2.000	184.000	.649	.005
	Wilks' Lambda	.995	.434(a)	2.000	184.000	.649	.005
	Hotelling's Trace	.005	.434(a)	2.000	184.000	.649	.005
	Roy's Largest Root	.005	.434(a)	2.000	184.000	.649	.005

a Exact statistic
b Design: Intercept
Within Subjects Design: Perceived_Control

Table 99 - Tests of Within-Subjects Effects for Perceived Control of Stressors across Work, Home and Personal Health Domains

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Perceived Control	Sphericity Assumed	1.333	2	.667	.439	.645	.002
	Greenhouse-Geisser	1.333	1.986	.671	.439	.644	.002
	Huynh-Feldt	1.333	2.000	.667	.439	.645	.002
	Lower-bound	1.333	1.000	1.333	.439	.508	.002
Error (Perceived Control)	Sphericity Assumed	562.000	370	1.519			
	Greenhouse-Geisser	562.000	367.417	1.530			
	Huynh-Feldt	562.000	370.000	1.519			
	Lower-bound	562.000	185.000	3.038			

6.3.5 Analysis of Variance for Generalised Self Efficacy

Hypothesis H06 predicts that project managers will have a greater sense of control over their ability to affect positive outcomes when managing stress, as measured by their general self-efficacy, than general populations. The author of the GSE measure (Schwartzer, 2006) provides a global database of GSE scores for use by researchers. This database is used as a control sample representing the "general population" to provide comparisons with the project manager sample collected for this study. An independent one-way t-test was conducted on the sample with group 1 = project managers, group 2 = general global population. The dependent variable is GSESUM. The analysis reveals a small but significant difference in means between the two groups with project managers reporting higher GSESUM [M=338565, SD=4.28222} scores than the general population [M=29.5932, SD=5.28725; t (19933) =14.511, p=.0005. The magnitude of the difference in the means was small but significant (eta squared = 0.01).

Table 100 - Group Statistics GSE Project Managers and General Population

	Group	N	Mean	Std. Deviation	Std. Error Mean
GSESUM	1.00	216	33.8565	4.28222	.29137
	2.00	19719	29.5932	5.28725	.03765

Table 101 - Independent Samples Test GSE Project Managers and General Population

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
GSESUM	Equal variances assumed	11.535	.001	11.808	19933	.000	4.26327	.36104	3.55560	4.97095
	Equal variances not assumed			14.511	222.240	.000	4.26327	.29379	3.68430	4.84225

As discussed in section 6.1.5 the age distributions of the two populations were considered to be potentially too different and as such a second t-test was conducted on the reduced global sample of over 25 year olds. The results of this t-test were similar to that of the full sample. The results are also presented below.

Table 102 - Group Statistics GSE Project Managers and General Population Over 25 Years

	Group	N	Mean	Std. Deviation	Std. Error Mean
Sumscore GSESUM	1.00	216	33.8565	4.28222	.29137
	2.00	5125	29.7766	5.24829	.07331

Table 103 - Independent Samples Test - GSE Project Managers and General Population Over 25 Years

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
GSESUM	Equal variances assumed	11.356	.001	11.268	5339	.000	4.07990	.36209	3.37006	4.78973
	Equal variances not assumed			13.579	243.043	.000	4.07990	.30045	3.48808	4.67171

6.3.6 Summary Variance Analysis

The analysis of variance in the mean scores for use of coping strategies supports the hypothesis H02 that project managers do indeed use more Active Coping and Planning than other types of coping when dealing with stress across all three (3) domains of work, home and personal health and that these strategies are used equally within each of the domains along with Acceptance. This result is in-line with the work of Schwartz and Stone (1993). In their investigation of coping with daily work problems they found a greater use of not only problem-focused coping with work based stressors but also Acceptance. Acceptance was not hypothesized to be used in combination with Active Coping and Planning but may be explained by the low sense of perceived control project managers reported over the specific stressful events reported. Because of their lack of perceived control they applied a high level of Acceptance of the situation as part of their coping process while also engaging in Active Coping and Planning to alter the situation and remove the stressor. Interestingly, this approach to coping has similarities to the process of risk and opportunity management which is considered to be one of the key disciplines of project management by organisations involved in projects (Kutsch and Hall, 2009). Risk management is described by the International Project Management Association in the International Competency Baseline as the process used to, *"eliminate the risk, mitigate it, share it, transfer or insure against the risk, develop a contingency plan or passively accept the risk.*" (International Project Management Association, 2006, 48). This process of directly identifying potential problems, developing and applying solutions but in the face of uncontrollable elements accepting risk and potential

negative outcomes is reflected in the results from this study on how project managers cope with work based stress. In addition the analysis has revealed that project managers also use Instrumental Support as frequently as Active Coping, Planning and Acceptance when coping with personal health stressors. This result may be explained by the higher need for additional fact based information with regards to personal health issues such as diseases.

Similar to other studies (Folkman and Lazarus, 1980, Schwartz and Stone, 1993) project managers were found to use more Active Coping and Planning when dealing with work-based stressors than with home-based and personal health stressors. Planning was used more at home than with personal health and Acceptance was used more at work than with personal health stressors. Additionally, there was no difference in the use of Active Coping between work and home-based stressors or in the use of Acceptance with work and home-based stressors. Generally it can be said that project managers use relatively more problem-focused strategies when dealing with work-based stressors than other stressors while simultaneously using more problem-focused coping strategies than emotion focused strategies when dealing with stressful situations across all three (3) domains.

The analysis of variance in regards to primary appraisal confirms the earlier finding that hypothesis H03 is false. Project managers do not appraise stressful situations as "challenges" more often than "threats". And in the case of personal health stressors there is a statistically significant difference in the mean scores from work and home-based stressors with personal health stressors being rated more frequently as threats.

The analysis of the variance of perceived control over specific stressful events confirms hypothesis H04 to be false. There is no statistically significant difference in the means across the three (3) domains and all means are centred on 2.5 out of 5.

Finally although project managers did not report a tendency to feel in control of the specific stressors described in this study they do report a higher than average level of general self-efficacy as compared to a general population sample. This result supports hypothesis H06 that project managers have a stronger belief in their own actions

resulting in positive outcomes in relation to managing stressful events, characterized by their level of GSE than general populations.

6.4 Exploratory Analysis

This study specifically addresses the hypotheses derived from the Transaction Theory of Coping which is bounded within the cognitive processes associated with selection and application of coping strategies to specific stressful situations. It does not extend to include the adaptiveness of the selected coping strategies or the impact of how stressful a specific event is perceived to be by the individual under stress and how this may affect coping strategy selection. This is however an important aspect to the process by which project managers cope with stress and for informing potential interventions. Respondents were asked to rate their overall level of stress on a 1 to 100 scale (CS01) and to rate the stressfulness of each individual stressful event described for work (CSW04), home (CSH04) and personal health (CSP04) stressors. The exploratory analysis reported in this section analyses the ratings for each of these stress ratings and the correlation with coping strategy selection.

6.4.1 Adaptiveness of coping strategy selection and application

The frequency and descriptive statistics for the overall stress rating reveal a mean stress rating (CS01) of 58.32 out of a possible 100. The range is from 0 to 100. The standard deviation is high at 21.318 showing perceived stressfulness of the events described being highly variable. The overall stress rating is moderate and tends towards the middle of the scale indicating that project managers do not on average feel overly stressed.

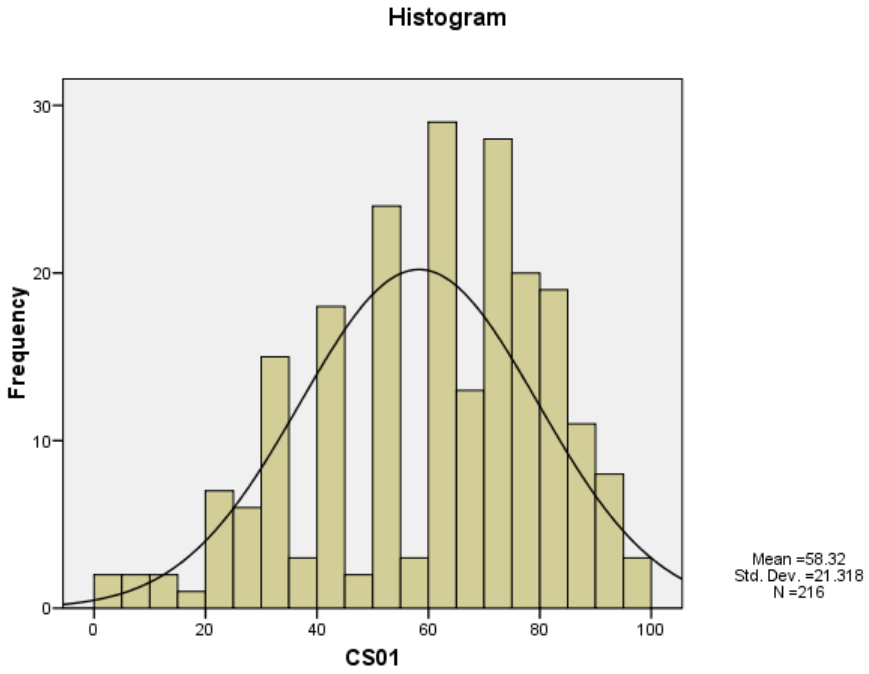

Figure 61 - Overall Stress Rating

The histograms below represent the frequency distribution for the stress ratings given for each specific stressor at work (CSW04), home (CSH04) and with their personal health (CSP04). The stress ratings for each specific stressor are high with means well above that for the overall stress rating. Work stressors were reported as being the most stressful with a mean of 80.76, SD=17.269 and the median is 85. Home stressors reported a slightly lower level of stress with a mean of 69.78, SD = 27.538 and median = 80. Personal health stressors had the widest distribution of stress ratings and the lowest overall score with a mean of 58.99, SD=28.856 and median = 60. The stress ratings for the specific work and home-based stressful events are much higher than the overall stress level. Although there is not enough data to draw definitive conclusions the results indicate that the way in which project managers choose to cope with stressful events, i.e. their coping strategy selection, is adaptive. Project managers are able to cope with individual stressful events in such a way that their overall stress levels are lower than the stress levels reported for each individual event.

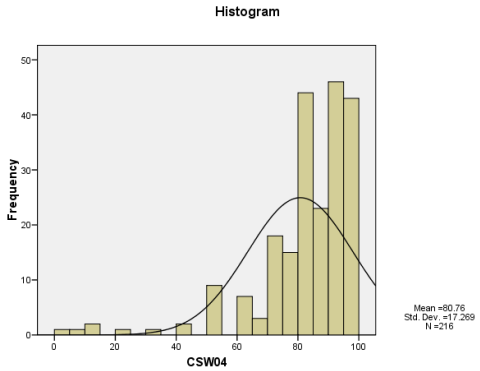

Figure 62 - Stressfulness rating of work-based stressor

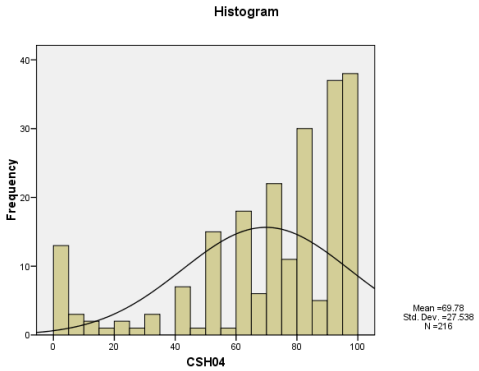

Figure 63 - Stressfulness rating of home-based stressor

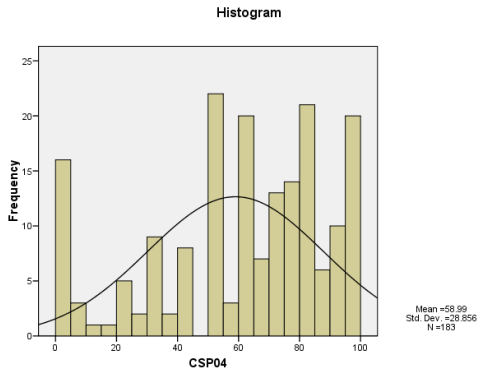

Figure 64 - Stressfulness rating of personal health stressor

6.4.2 The relationship between stressfulness and coping strategy selection

The relationship between overall stress and the perceived stressfulness of each individual event and the coping strategy selection by project managers is explored through correlation analysis. The table below details the full results. The significant correlations are highlighted.

The overall level of stress has a strong positive correlation with the stressfulness of the individual work-based stressful event indicating that those who reported a high stress level for individual work-based stressful events reported higher levels of overall stress. The same positive correlation was found with home and personal health stressors however the relationship was not as strong. These results indicate that work-based stressors are potentially greater influencers of overall stress levels and contribute to the relevance of this study. If work-based stressors contribute more broadly to overall stress then understanding how work practices such as project

management affect how we cope with stress is an important component to managing and reducing the impact and cost to individuals and industry from stress.

Overall stress ratings are positively correlated to a greater use of a wide range of emotion-focused coping strategies when dealing with work-based stressors including Self-Distraction, Denial, Use of Emotional Support, Behavioural Disengagement, Venting, Religion and Self-Blame. Project managers with higher overall stress levels use more emotion-focused coping strategies. The correlations between specific stressful event stress ratings and coping strategy selection for work-based stressors was similar to overall stress ratings with the additional use of Substance Use and Use of Informational Support.

Table 104 - Correlation Stress Ratings and Work-based Coping Strategy Selection

		CS01	CSW04
CS01	Pearson Correlation	1	**.471(**)**
	Sig. (2-tailed)		.000
	N	216	216
CSW04	Pearson Correlation	**.471(**)**	1
	Sig. (2-tailed)	.000	
	N	216	216
CSW_SD	Pearson Correlation	**.147(*)**	.128
	Sig. (2-tailed)	.032	.061
	N	215	215
CSW_AC	Pearson Correlation	-.017	.098
	Sig. (2-tailed)	.801	.153
	N	215	215
CSW_D	Pearson Correlation	**.233(**)**	**.150(*)**
	Sig. (2-tailed)	.001	.028
	N	215	215
CSW_SU	Pearson Correlation	.064	**.156(*)**
	Sig. (2-tailed)	.348	.022
	N	215	215
CSW_UES	Pearson Correlation	**.192(**)**	**.202(**)**
	Sig. (2-tailed)	.005	.003
	N	215	215
CSW_UIS	Pearson Correlation	.098	**.162(*)**
	Sig. (2-tailed)	.153	.017
	N	215	215
CSW_BD	Pearson Correlation	**.201(**)**	.050
	Sig. (2-tailed)	.003	.469
	N	215	215
CSW_V	Pearson Correlation	**.277(**)**	**.260(**)**
	Sig. (2-tailed)	.000	.000
	N	215	215

CSW_PR	Pearson Correlation	-.030	-.053
	Sig. (2-tailed)	.666	.436
	N	215	215
CSW_P	Pearson Correlation	-.037	.064
	Sig. (2-tailed)	.591	.348
	N	215	215
CSW_H	Pearson Correlation	-.035	.004
	Sig. (2-tailed)	.615	.954
	N	215	215
CSW_A	Pearson Correlation	-.037	.002
	Sig. (2-tailed)	.593	.978
	N	215	215
CSW_R	Pearson Correlation	**.147(*)**	.061
	Sig. (2-tailed)	.032	.374
	N	215	215
CSW_SB	Pearson Correlation	**.193(**)**	**.146(*)**
	Sig. (2-tailed)	.004	.033
	N	215	215

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The table below reports the correlations between stress ratings and use of coping strategies when dealing with home-based stressors. The correlation between overall stress and specific event stressfulness ratings is significant but small. Unlike for work-based stressors the overall stress rating is not correlated with the use of any individual coping strategies. There are a number of significant but small positive correlations between the stressfulness of a specific home-based event and coping strategy selection including Self Distraction, Denial, Substance Use, Use of Emotional Support, Use of Informational Support, Behavioural Disengagement, Planning and Self Blame. Self Blame recorded the strongest relationship.

Table 105 - Correlation Stress Ratings and Home-based Coping Strategy Selection

		CS01	CSH04
CS01	Pearson Correlation	1	**.150(*)**
	Sig. (2-tailed)		.028
	N	216	216
CSH04	Pearson Correlation	**.150(*)**	1
	Sig. (2-tailed)	.028	
	N	216	216
CSH_SD	Pearson Correlation	.030	**.163(*)**
	Sig. (2-tailed)	.659	.016
	N	215	215
CSH_AC	Pearson Correlation	.035	.066
	Sig. (2-tailed)	.609	.332
	N	215	215
CSH_D	Pearson Correlation	.068	**.178(**)**
	Sig. (2-tailed)	.319	.009

	N	215	215
CSH_SU	Pearson Correlation	-.027	**.209(**)**
	Sig. (2-tailed)	.696	.002
	N	215	215
CSH_UES	Pearson Correlation	.013	**.147(*)**
	Sig. (2-tailed)	.854	.032
	N	215	215
CSH_UIS	Pearson Correlation	.133	**.148(*)**
	Sig. (2-tailed)	.051	.030
	N	215	215
CSH_BD	Pearson Correlation	.061	**.153(*)**
	Sig. (2-tailed)	.374	.025
	N	215	215
CSH_V	Pearson Correlation	.072	.116
	Sig. (2-tailed)	.295	.089
	N	215	215
CSH_PR	Pearson Correlation	-.013	-.094
	Sig. (2-tailed)	.849	.167
	N	215	215
CSH_P	Pearson Correlation	.022	**.180(**)**
	Sig. (2-tailed)	.743	.008
	N	215	215
CSH_H	Pearson Correlation	-.044	-.131
	Sig. (2-tailed)	.525	.056
	N	215	215
CSH_A	Pearson Correlation	-.036	.053
	Sig. (2-tailed)	.595	.441
	N	215	215
CSH_R	Pearson Correlation	.042	.126
	Sig. (2-tailed)	.540	.066
	N	215	215
CSH_SB	Pearson Correlation	.006	**.303(**)**
	Sig. (2-tailed)	.935	.000
	N	215	215

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

As with home-based stressors the overall stress rating was not significantly correlated with the use of any coping strategies when managing stressful events associated with personal health. Stressfulness ratings for the specific events reported were significantly and positively correlated with eleven (11) of the fourteen (14) coping strategies indicating that the more stressful a personal health stressor is perceived to be the more of all types of coping are applied. The three (3) strategies that are not correlated with perceived stressfulness of the event include Self Distraction, Positive Reframing and Humour.

Table 106 - Correlation Stress Ratings and Personal Health Coping Strategy Selection

		CS01	CSP04
CS01	Pearson Correlation	1	**.257(**)**
	Sig. (2-tailed)		.000
	N	216	183
CSP04	Pearson Correlation	**.257(**)**	1
	Sig. (2-tailed)	.000	
	N	183	183
CSP_SD	Pearson Correlation	.051	.135
	Sig. (2-tailed)	.491	.070
	N	187	180
CSP_AC	Pearson Correlation	.136	**.252(**)**
	Sig. (2-tailed)	.065	.001
	N	186	179
CSP_D	Pearson Correlation	.068	**.275(**)**
	Sig. (2-tailed)	.359	.000
	N	186	179
CSP_SU	Pearson Correlation	-.078	**.222(**)**
	Sig. (2-tailed)	.289	.003
	N	185	178
CSP_UES	Pearson Correlation	.113	**.369(**)**
	Sig. (2-tailed)	.126	.000
	N	186	179
CSP_UIS	Pearson Correlation	.171(*)	**.346(**)**
	Sig. (2-tailed)	.020	.000
	N	186	179
CSP_BD	Pearson Correlation	.054	**.154(*)**
	Sig. (2-tailed)	.463	.040
	N	186	179
CSP_V	Pearson Correlation	.124	**.296(**)**
	Sig. (2-tailed)	.092	.000
	N	186	179
CSP_PR	Pearson Correlation	-.049	-.013
	Sig. (2-tailed)	.511	.864
	N	186	179
CSP_P	Pearson Correlation	.108	**.398(**)**
	Sig. (2-tailed)	.146	.000
	N	184	177
CSP_H	Pearson Correlation	-.001	.058
	Sig. (2-tailed)	.991	.441
	N	186	179
CSP_A	Pearson Correlation	-.095	**.228(**)**
	Sig. (2-tailed)	.197	.002
	N	186	179
CSP_R	Pearson Correlation	.130	**.188(*)**
	Sig. (2-tailed)	.076	.012
	N	186	179
CSP_SB	Pearson Correlation	.211(**)	**.295(**)**
	Sig. (2-tailed)	.004	.000
	N	186	179

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

7 SUMMARY AND CONCLUSIONS

7.1 Introduction

Stress and the affects of badly managed stress are a costly reality of the current world. As discussed in early sections the cost to industry, society and individuals is enormous and growing at a rapid pace. Seeking to understand what drives stress, how individuals attempt to cope with stressful situations and how well these attempts are implemented is critical to reducing the cost associated with the negative aspects of stress while also maintaining the positive aspects.

Much research has been done into the fields of stress management associated with health issues, student populations and with stress in general management however there have been few studies focusing specifically on the management of stress by project managers. Projects as a way of doing business have become increasingly popular in recent years. With its focus on strategic delivery and flexibility to up and down scale as economic circumstances require, projects as a way of working is likely to continue to grow in popularity and rise to be one of the dominant business structures. The very construct of projects is that of single one-off unique endeavours that are time, cost and quality bound placing instant pressure on those within the project. To cope with this pressure and ensure deliverables can be produced efficiently within these bounds, project management has a developed a specific culture with problem-solving and planning as its foundation. It is in this way that project management differs from general management and other forms of operational management which traditionally take a longer term whole of business view and "profit and loss" responsibilities (Colley et al., 2007) . It is from this concentrated environment of planning and actively attempting to solve the problem presented by each new project that the hypotheses for this study emerged.

This thesis investigates the effect of acculturisation by project managers to the culture of project management within their organisations on their coping strategy selection in managing stressful situations at work, home and with their personal health.

The findings from this study indicate that project managers consistently use Planning, Active Coping and Acceptance significantly more than any other form of coping and in particular all other forms of emotion-focused coping. This finding differs from most other studies that have found people tend to use more problem-focused coping (Planning and Active Coping) when coping with work based stressors (Folkman and Lazarus, 1980, Schwartz and Stone, 1993, Patterson, 2003) but use more emotion-focused coping strategies when dealing with personal stressors (home or health) (Folkman and Lazarus, 1980, Karlsen and Bru, 2002, Patterson, 2003). This consistent use of problem-focused coping strategies was exhibited despite there being a relatively low level of reported perceived control over the specific stressful situations. It is commonly reported in studies on other population types that perceived control is related to the use of more problem-focused coping strategies (Folkman and Lazarus, 1980, Endler et al., 2000, Troup and Dewe, 2002). This study also indicates that project managers have a higher than normal sense of Generalised Self Efficacy (GSE), believing successful outcomes are likely to result from their own actions. GSE was significantly but weakly related to the use of some coping strategies however there was not enough strength in the relationship to warrant the belief that project managers' sense of control (as represented by GSE) is the dominant influence in coping strategy selection. Finally this study demonstrates that individual project management competence is positively correlated to and in some instance a predictor of the use of Planning, Active Coping and Acceptance.

This final chapter presents a summary of the background and main findings of empirical research into the relationships between project management culture and coping strategies used by project managers when managing stressful situations at work, home and with their personal health. Contributions and limitations of the research are discussed and directions for further research are identified.

7.2 Research Hypotheses

This study explores the coping strategy selection process of project managers across the three (3) domains of work, home and personal health stressors. This study hypothesized that project managers, because of their exposure to project management culture, use more Planning and Active Coping strategies when dealing with stressful

situations across all three (3) domains than emotion-focused coping strategies. The theoretical framework, the Transactional Theory of Coping, is used to conceptualise the cognitive process of appraisal that project managers go through with each stressful situation in determining which coping strategies will be applied. The Transactional Theory of Coping has an inherent assumption of perceived control embedded within it. Perceived control is thought to influence the selection process for coping strategies. This study examines the effect of perceived control and the independent effect of project management culture on the coping strategy selection process for project managers. From this model six (6) research questions were derived. From these six (6) questions, fourteen (14) individual hypotheses were devolved including:

1. **What are the dispositional coping strategies used by Project Managers in stressful situations?**

H01: That project managers use more problem-focused coping strategies, specifically active coping and planning, than emotion-focused strategies when dealing with stressful situations in general.

2. What are the coping strategies used by Project Managers in specific stressful situations?

H02: That project managers use more problem-focused coping strategies than emotion-focused strategies when coping with specific stressful situations across all three (3) domains, work, home and personal health.

3. **What role does perceived control have in the primary appraisal component of the coping process for project managers?**

H03: That project managers appraise stressful situations as "challenges" rather than "threats" across all three (3) domains, work, home and personal health.

H04: That project managers appraise stressful situations across all three (3) domains, work, home and personal health as "amenable to change" more often than uncontrollable.

H05: That appraisals of stressful situations as “amenable to change” will be positively correlated with “challenge” appraisals across all three (3) domains, work, home and personal health.

4. **What role does perceived control have in the secondary appraisal component of the coping process for project managers?**

H06: That project managers will have a stronger belief in their own actions resulting in positive outcomes in relation to managing stressful events, characterised by their level of General Self-Efficacy (GSE) than general populations.

H07: That GSE will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.

H08: That GSE will be a predictor of active coping and planning across all three (3) domains, work, home and personal health. Specifically that higher GSE scores will predict greater use of active coping and planning.

5. **What is the overall effect of control on coping strategy selection?**

H09: That perceived control appraisals, challenge/threat appraisals and GSE will be predictors of coping strategy selection. Specifically, higher levels of perceived control, challenge appraisals and higher GSE scores will predict the use of problem focused coping strategies across all three (3) domains, work, home and personal health.

6. **What role does project management culture have in coping process for project managers?**

H010: That project management culture will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.

H11: That project management culture will be negatively correlated with the use of emotion-focused coping strategies in dealing with stressful situations across all three (3) domains, work, home and personal health.

H12: That project management culture will be a predictor of the use of active coping and planning as the dominant coping strategies used in dealing with stressful situations across all three (3) domains, work, home and personal health.

H13: That project management culture will be a predictor of "challenge" and "amenable to change" appraisals of stressful situations across all three (3) domains, work, home and personal health.

H14: That project management culture will be positively correlated with GSE.

7.3 Main Research Findings

7.3.1 Confirmatory Analysis Findings

The findings from the study are presented below for each of the six (6) research questions. Each hypothesis is restated with the key findings from the analysis repeated below. Table 107 below includes a summary of the findings for each hypothesis.

Table 107 - Summary Findings by Hypothesis

Number	Hypothesis	Finding
H01	That project managers use more problem-focused coping strategies, specifically active coping and planning, than emotion-focused strategies when dealing with stressful situations in general.	Accepted
H02	That project managers use more problem-focused coping strategies than emotion-focused strategies when coping with specific stressful situations across all three (3) domains, work, home and personal health.	Accepted
H03	That project managers appraise stressful situations as "challenges" rather than "threats" across all three (3) domains, work, home and personal health.	Rejected
H04	That project managers appraise stressful situations across all three (3) domains, work, home and personal health as "amenable to change" more often than uncontrollable.	Rejected
H05	That appraisals of stressful situations as "amenable to change" will be positively correlated with "challenge" appraisals across all three (3) domains, work, home and personal health.	Rejected
H06	That project managers will have a stronger belief in their own actions resulting in positive outcomes in relation to managing stressful events, characterised by their level of General Self-Efficacy (GSE) than general populations.	Accepted
H07	That GSE will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.	Partially Accepted
H08	That GSE will be a predictor of active coping and planning across all three (3) domains, work, home and personal health. Specifically that higher GSE scores will predict greater use of active coping and planning.	Partially Accepted

Number	Hypothesis	Finding
H09	That perceived control appraisals, challenge/threat appraisals and GSE will be predictors of coping strategy selection. Specifically, higher levels of perceived control, challenge appraisals and higher GSE scores will predict the use of problem focused coping strategies across all three (3) domains, work, home and personal health.	Rejected
H10	That project management culture will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health	Partially Accepted
H11	That project management culture will be negatively correlated with the use of emotion-focused coping strategies in dealing with stressful situations across all three (3) domains, work, home and personal health.	Rejected
H12	That project management culture will be a predictor of the use of active coping and planning as the dominant coping strategies used in dealing with stressful situations across all three (3) domains, work, home and personal health	Partially Accepted
H13	That project management culture will be a predictor of "challenge" and "amenable to change" appraisals of stressful situations across all three (3) domains, work, home and personal health.	Rejected
H14	That project management culture will be positively correlated with GSE	Partially Accepted

a. Confirmatory Analysis Results

What are the dispositional coping strategies used by Project Managers in stressful situations?

H01	That project managers use more problem-focused coping strategies, specifically active coping and planning, than emotion-focused strategies when dealing with stressful situations in general.

Univariate analysis shows the mean scores for Active Coping (7.23) and Planning (7.01) are higher than for all other forms of coping strategies. A one-way repeated measure ANOVA revealed significant differences in the means between the fourteen (14) coping strategies. There was no significant difference in the means for Active Coping and Planning. There was a significant difference between both Active Coping and Planning and the remaining twelve (12) coping strategies. These results suggest that H01 is true; project managers do use more problem-focused coping strategies, specifically Active Coping and Planning, than emotion-focused coping strategies when dealing with stressful situations in general.

What are the coping strategies used by Project Managers in specific stressful situations?

H02	That project managers use more problem-focused coping strategies than emotion-focused strategies when coping with specific stressful situations across all three (3) domains, work, home and personal health.

Univariate analysis shows the mean scores for Active Coping (7.07) and Planning (7.06) are higher than for all other forms of coping strategies for work-based stressors. Planning (6.30), Acceptance (6.13) and Active Coping (5.97) are the three (3) highest rated coping strategies for home-based stressors. And Active Coping (6.03), Acceptance (5.85) and Planning (5.73) are the three (3) highest rated coping strategies for personal health stressors. A series of one-way repeated measure ANOVAs revealed significant differences in the means between the fourteen (14) coping strategies within each of the three (3) domains. There is no statistical difference in means for Active Coping and Planning for work-based stressors and there is a

significant difference between both Active Coping and Planning and the remaining twelve (12) coping strategies. Similarly for both home-based and personal health stressors there is no statistical difference in the means for the three (3) most frequently used strategies Active Coping, Planning and Acceptance however all three (3) are significantly different (and higher) than the remaining eleven (11) strategies. These results suggest that H02 is true; project managers do use more problem-focused coping strategies, specifically Active Coping and Planning, than emotion-focused coping strategies when dealing with stressful situations across all three (3) domains.

What role does perceived control have in the primary appraisal component of the coping process for project managers?

H03	That project managers appraise stressful situations as "challenges" rather than "threats" across all three (3) domains, work, home and personal health.
H04	That project managers appraise stressful situations across all three (3) domains, work, home and personal health as "amenable to change" more often than uncontrollable.
H05	That appraisals of stressful situations as "amenable to change" will be positively correlated with "challenge" appraisals across all three (3) domains, work, home and personal health.

All three (3) of the hypotheses related to perceived control and primary appraisal were found to be false. Univariate analysis revealed no tendency for project managers to rate specific stressful events as "challenges" rather than "threats" and similarly there was no clear indication that project managers felt they could control or change the situation. Scree plot analyses found no linear or curvilinear relationships between the measures as was expected. All hypotheses H03, H04 and H05 are rejected.

What role does perceived control have in the secondary appraisal component of the coping process for project managers?

H06	That project managers will have a stronger belief in their own actions resulting in positive outcomes in relation to managing stressful events, characterised by their level of General Self-Efficacy (GSE) than general populations.
H07	That GSE will be positively correlated with the use of problem-focused coping

	strategies, specifically active coping and planning across all three (3) domains, work, home and personal health.
H08	That GSE will be a predictor of active coping and planning across all three (3) domains, work, home and personal health. Specifically that higher GSE scores will predict greater use of active coping and planning.

Hypotheses H06, H07 and H08 explore the relationship between generalised self efficacy (GSE), the dispositional sense of control over affecting positive outcomes with respect to managing stressful situations, and coping strategy selection. The hypotheses look for positive correlations and predictive ability of GSE in relation to coping strategy selection.

H06 was analysed using an independent t-test which showed a statistically significant difference in the mean GSE scores between project managers and those of the control group taken from a global general population, thus providing support for acceptance of H06.

Only partial support was found for hypotheses H07 and H08. The relationship between GSE and coping strategy selection is weak and although statistically significant in a small number of cases, the strength of the relationship is not such that conclusive results can be drawn.

What is the overall effect of control on coping strategy selection?

H09	That perceived control appraisals, challenge/threat appraisals and GSE will be predictors of coping strategy selection. Specifically, higher levels of perceived control, challenge appraisals and higher GSE scores will predict the use of problem focused coping strategies across all three (3) domains, work, home and personal health.

A standard regression analysis was conducted using the three (3) measures of perceived control, primary appraisal (threat/challenge) and generalised self efficacy as predictors of coping strategy selection. Although some models returned positive relationships showing significant contributions are made to coping strategy selection

by one or two of the independent variables there magnitude of the explained variance was extremely small. The small magnitude combined with the inconsistency in results mean that hypothesis H09 is not supported and is thus rejected.

What role does project management culture have in coping process for project managers?

H10	That project management culture will be positively correlated with the use of problem-focused coping strategies, specifically active coping and planning across all three (3) domains, work, home and personal health
H11	That project management culture will be negatively correlated with the use of emotion-focused coping strategies in dealing with stressful situations across all three (3) domains, work, home and personal health.
H12	That project management culture will be a predictor of the use of active coping and planning as the dominant coping strategies used in dealing with stressful situations across all three (3) domains, work, home and personal health
H13	That project management culture will be a predictor of "challenge" and "amenable to change" appraisals of stressful situations across all three (3) domains, work, home and personal health.
H14	That project management culture will be positively correlated with GSE

Project management culture is conceptualized in this study as the combination of duration of time spent working in project management and as a project manager, the perceived organisational project management maturity respondents apply their project management skills in and the application of project management skills as defined by the GAPPS project manager standard. The duration or exposure to project management and the perceived organisational project management maturity is not significantly correlated with the use of any coping strategies in any domain. However Pearson correlation analysis shows that the measure of individual project management competence is significantly and positively correlated with the use of Active Coping and Planning, proving H10 to be true. No significant correlations were found with any of the emotion-focused coping strategies, thus H11 is rejected.

A series of one-way repeated measure ANOVAs was conducted to explore the predictive ability of project management culture. The results showed that there is some predictability based on individual project management competence for the use of Planning and Active Coping with small percentages of the variance in usage for work and home-based stressors being predicted by CQSUM scores. However there was no predictability found for personal health stressors. The results provide some support for hypothesis H12 however the results are weak and it is not possible to drawn definitive conclusions about predictability.

No statistically significant results were found for the predictive capability of project management culture for primary appraisal (threat/challenge) or perceived control ratings. Thus hypothesis H13 is false.

Analysis of the Pearson correlation between GSE and project management culture shows that there is a small but significant positive correlation between individual project management competence and GSE. The analysis continues to the sub-scales within the CQSUM measure revealing significant positive correlations between CQ1, CQ2, CQ3, CQ5 and CQ6 with the strongest correlations being between GSE and CQ2 (Manage the development of the plan for the project) and CQ6 (Evaluate and Improve Project Performance). Based on these findings, hypothesis H14 is accepted.

7.3.2 Exploratory Analysis Findings

The exploratory analysis investigated two (2) questions, firstly what is the relationship between how stressful a specific event is perceived, the overall stress level of the respondent and the coping strategies selected and secondly is there any relationship between how stressful specific events are perceived to be and overall stress ratings. Pearson correlations were used to examine the relationships. There is strong correlation between overall stress ratings and the level of stressfulness reported for work-based stressors. Although not conclusive, work-based stressors appear to be the most significant contributor to overall stress.

The data associated with overall stress ratings and the individual stressfulness ratings for the specific stressful events reported for work, home and personal health vary

significantly. The specific stressful events were all rated significantly more stressful than the overall level of perceived stress felt by the respondents. This result indicates that the cumulative stressfulness of events at work, home and with personal health issues is lower than for the events themselves. This can be interpreted as the selected coping strategies being adaptive resulting in reduction of the stress associated with each stressful situation. For project manager the selection and use of Active Coping, Planning and Acceptance in managing stressful situations is adaptive.

7.3.3 Summary Findings

Overall this study establishes that project managers consistently select and use Active Coping, Planning and Acceptance when coping with stressful situations in all three (3) domains of work, home and personal health. These three (3) strategies are selected and applied significantly more than all other coping strategies including Self-Distraction, Denial, Substance Use, Use of Emotional Support, Use of Instrumental Support, Behavioural Disengagement, Venting, Positive Reframing, Humour, Religion, and Self-Blame.

Project management culture was found to be poorly constructed with no significant relationship found between two (2) of the three (3) elements of culture defined in this study (duration of experience and perceived organisational project management maturity) and the selection and use of coping strategies. However, one (1) element, individual project management competence, was found to have small but positive correlations with coping strategy selection particularly for Active Coping and Planning across all three (3) domains.

No support was found for the hypotheses that project managers have a high sense of perceived control over specific stressful situations and there was no statistically significant correlation between perceived control, primary appraisal and coping strategy selection.

Project managers were found to have a higher than average belief in their own ability to affect positive outcomes (generalised self efficacy) when managing stressful situations and this belief has a small positive correlation with the use of Active

Coping and Planning in some situations but is not consistent across all domains. The fact that no correlation was found between perceived control ratings for specific events and the GSE scores can be interpreted to mean that the control is not necessarily bounded by control over the external. Project managers may feel "in control" internally while accepting that external objective control is not possible. This finding is similar to that by Troup and Dewe who state that "control may have its most powerful influence when it is internally focused" (2002, 351)

The exploratory analysis indicates that the level of overall stress felt by project managers is primarily contributed to by work-based stressors which are perceived to be more stressful than either home or personal health stressors.

The conclusion drawn from these results is that the direct application of project management skills in the work place has a positive relationship with the use of problem-focused coping strategies particularly Active Coping and Planning. It is this direct application of skills that has the strongest relationship with the psychological functioning of an individual. Merely being immersed in an environment that is focused on planning and active problem solving is not enough to influence or be related to how individuals cope with stress. Additionally the concept of control and its potential impact on the coping process for project managers has been shown to be insignificant. The relationship between project management competence and coping strategy selection is not moderated by a higher sense of control felt by project managers.

Although there are no definitive guidelines for what constitutes good and bad coping strategies, some strategies may be more or less effective in different situations with different individuals, the results of this study indicate that the selection and use of Active Coping, Planning and Acceptance by project managers is consistent across all three (3) domains and is adaptive with lower overall stress levels than the stressfulness ratings of each individual stressor.

As a product of this research it is hoped that organisations will find ways in which to assist their employees better manage the inherent stress within their role. However, if employees are to successfully manoeuvre their way through the stress process

organisations must make it possible for individuals to have direct means of actioning their problems and reduce any potential blockers. Gällstedt (2003) suggests that there are nine (9) common types of project incidents that cause stress on projects. The findings from this study suggest that project managers will look for ways to actively cope with their stress. Organisations can therefore provide pathways, processes and develop cultures that will facilitate this process. The table below provides some potential organisational responses to the nine (9) project incidents outlined by Gällstedt (2003)

Table 108 - Potential Organisational Responses to Facilitate Project Manager Stress Management

Gällstedt: Types of Project Incidents Causing Stress	**Aitken: Potential Organisational Response to Facilitate Stress Management**
1. The vanish of valuable resources	Process to obtain additional resources through predefined and understood channels
2. The dry out of other organisational duties	Open lines of communication between project manager and supervisor to discuss work load balancing Well developed resource management integrated with both portfolio and BAU workloads to identify overworked individuals
3. The betrayal of project or self	Strong governance, sponsorship and steering committees
4. The circling design loops	Improved client requirements gathering processes Strong governance, sponsorship and steering committees
5. The changes in project owner preferences	Strong governance, sponsorship and steering committees
6. The assistance others depend upon	Open lines of communication between project manager and supervisor to discuss work load balancing
7. The prioritising of other projects	Strong governance, sponsorship and steering committees - Provide detailed information on why a project has been reprioritized - Provide avenues for making the project successful and well acknowledged despite being lower in priority - Offer pathways to new projects in the near future

8. The premature close down of projects	Strong governance, sponsorship and steering committees - Provide detailed information on why a project has been reprioritized - Offer pathways to new projects
9. The human absence	Process to obtain additional resources through predefined and understood channels

7.4 Contributions

The negative effects of stress and the cost of stress are well documented and a significant problem to industry as well as individuals and governments supporting health care programs. As the field of stress and coping has developed over the past few decades numerous studies have been conducted to refine the theories of stress and coping resulting in a number of well ground frameworks for conceptualizing and testing the coping processes and outcomes of individual and groups. One of the key features of the stress management research conducted to date is that it is conducted with narrow groups of people who are considered to be similar by the nature of the stress they encounter. So there is a proliferation of research on university students coping with examination stress, patients dealing with specific diseases (e.g. diabetes, bowel cancer, breast cancer) and athletes coping with sporting related stress. Very little research has been conducted based on similarities in coping behaviours for groups based on the type of work performed. In the case of the research into health care workers and police the focus remains on the unifying feature being the type of stressors they encounter rather than as a function of the work culture or practices of being a health care worker or police person. The nearest research is that conducted by Kobasa (1985) into the concept of hardiness which looked for patterns in the psychology of managers that affect their ability to manage stress successfully and the derivative works including (Maddi, 2002, Chan, 2003, Judkins et al., 2005, Maddi et al., 2006, Khodadadi et al., 2008). To date very little research has been conducted in the field of project management and stress with only three (3) papers being recorded in the International Journal for Project Management (Sommerville and Langford, 1994, Gällstedt, 2003, Smith et al., 2011). Sommerville and Langford and Gällstedt both look at the drivers of stressors within projects. Neither study looks into the

concept of coping strategy selection nor how this relates to the culture created by project management. Smith looks at the interaction of optimism on project success with the outcome of stress management being one of the influencing factors. Smith et al do not look in any detail at how stress is managed just that it is managed.

The concept and importance of stress and effective stress management is emerging as an important feature within the project management community. This is evidenced by the inclusion of both self awareness and stress management as topics within a number of the project management standards developed by project management professional bodies including the Project Management Institute, International Association for Project Management and the Association for Project Management.

This study provides the first empirical research on how project managers cope with stress and how this coping strategy selection is influenced by their sense of control and their emersion in project management culture. This study is one of the few in the psychology field to test the hypothesis that coping strategy selection is related to the work practices and culture of the respondents across a wide range of varying stressful events. I.e. where the common unifying element for the sample is their work practice and job role rather than the type of stressors they encounter.

The outcomes of this research provide a foundation for understanding how project managers attempt to cope with stress which will inform and improve the ways in which organisations attempt to support project managers in their stress management. For professional associations who have included stress management as a competency in their standards the results of this study provide evidence to support the notion that the way in which stress is managed by project managers is unique and related to their chosen profession. This study and future research can be used by professional associations to refine the recommended activities project manager apply to effectively manage stress in the context of projects.

7.5 Limitations

This study has provided a broad view of project manager coping strategy selection. The breadth of the study, a sample of 216 respondents reporting on coping strategy

selection across work, home and personal health stressors was obtained by use of self-report data through a web-based questionnaire. This breadth of understanding is required to provide a foundation of knowledge from which further research (discussed in more detail in section 8.6 below) can be conducted. The primary limitation to this study is that stress and how individuals cope with specific stressors has a depth of complexity that is not able to be explored using the self-report and web-based questionnaire methodology. This limitation provides guidance for future research however it does not invalidate any of the data collected and analysed in this study.

a. Sample construction

The sample for this study is not a random sample. It is comprised predominantly of project managers from within organisations that are known to the researcher and agreed to participate in the study. The number of participants from each organisation also varies considerably and is not related to the overall size of the project manager populations within each organisation. In addition, the researcher is unaware of the complete list of potential respondents who were invited to participate in the study as the direct invitations were managed by the single coordinator for each participating organisation. These factors render it impossible to accurately obtain figures for response rate. The lack of randomization in the sample may affect the generalisability of the results and should be considered when examining the results. However, this issue is countered by the well balanced composition of the sample across industries, private and public sector, internal and external projects and geography.

b. Sample size

The overall sample size for this study, N=215, is comparable with similar studies on stress and coping. Sample sizes for stress studies conducted on undergraduate samples and health patient samples tend to be larger with researchers having access to greater numbers of potential respondents through classes being taught and inpatient access. Management samples are harder to obtain broad and representative samples from and the sample size for this study is comparable with other management studies. The sample for this study is also a diverse and well balanced sample of project managers from over thirty (30) different organisations, across multiple industries, public and private sectors and globally distributed. The sample size is too small to allow for decomposition to allow for analysis by project type,

industry or other factors. The sample size is also reduced to N=186 when looking at full data sets including personal health stressors. Personal health stressors was the only component of the study to be optional for respondents based on feedback obtained that within the 12 month period allowed it would be common for respondents to have experience no stressful personal health issues.

c. Organisational Project Management Maturity

This study used a simple single question assessment of organisational project management maturity. The decision to use a simple one question item based on perception rather than objective evidence was taken based on the perceived time and effort required to capture a full and objective assessment of organisational competence being beyond that which was feasible by either the researcher or the participating organisation especially considering the global nature of the sample. The final results show no statistically significant relationship between the perceived maturity of the organisation and the use of coping strategies. This lack of evidence may be caused by the simplified nature of the assessment of maturity as compared to the detailed nature of individual project management competence assessment which does reveal significant relationships with coping strategy selection.

d. Self-Report Data

As discussed in the section 6.4.5 the use of self-report data in this study is believed to have resulted in accurate data for both the performance assessment and psychological assessment instruments. Although the method and resulting data are considered to be accurate and appropriate the decision invariably leads to a limitation of this study in that the depth of complexity within how each individual copes with specific stressors cannot be measured. This study provides a broad overview of how project managers attempt to cope with stress across multiple life domains providing insights into the patterns of coping that are unique to project managers and how these patterns are related to the use of project management skills. The limitation in depth of understanding of the complexity of the coping strategy selection and application process and the adaptive or maladaptive outcomes is the major driver for the suggested future research discussed in section 8.6 below.

The second limitation imposed by the use of self-report data is that only a single perspective has been obtained. Informant reports from peers, supervisors, family and friends can "address new questions that cannot be examined with self-reports alone" (Vazire, 2006, 474). Informant reports can provide additional perspectives on both project management competence and the coping process. This study considered the use of informant reports to be too complex to administer given the sample size and distribution globally as well as the need for a diverse range of informants. The use of informant reports is considered an important addition to the research design and is discussed further in section 8.6 below.

7.6 Future Research

The scope of future research in this field is wide. This study is the first of its kind in exploring the affect of project management as a method of work on the coping strategy selection of project managers at work, home and with their personal health. It is recommended that future research explore four (4) key aspects

1. Drivers of work-based stressors for project managers
2. Coping strategy selection, application, reappraisal cycles within individual stressful events
3. Informant reporting – multiple perspectives
4. Outcomes of coping both adaptive and maladaptive

1. Drivers of work-based stressors for project managers

As discussed in previous sections, projects are inherently stressful environments. Understanding the drivers of stress within the confines of the project environment will assist the project management community in early identification and potential prevention of negative outcomes. In many instances the stressors may not be able to be removed as they may be inherent in the structure of project work however with awareness comes the ability to ensure adequate support is made available at the most appropriate times for project managers and personnel. This study has captured qualitative data in the form of work-based stressor descriptions. They are not analysed or included in this thesis as the data is unrelated to the research questions. Respondents were asked to describe the event merely to focus their attention on a

single actual event to allow for the Brief COPE instrument to be applied situationally. It is recommended that this data be analysed to identify the drivers of stress within a work context for project managers. This broad base of data will allow the assumption that projects are inherently stressful (with the implication that projects are what project managers find most stressful within a work context) to be tested. The question was worded such that respondents were not limited to project based stressors, they were asked to report on the most stressful event at work in the past 12 months. An analysis of this data will reveal whether projects are the main source of stressful events or whether other work based events are considered more stressful.

2. **Coping strategy selection, application, reappraisal cycles within individual stressful events**

The depth and complexity of the coping process should be explored in future research. It is recommended that a qualitative methodology be applied in the form of one-on-one interviews to probe the complexities of the coping process including; the order in which coping strategies are applied; the number or reappraisal cycles that are engaged before the stressor is considered to be "dealt with", the interaction of problem and emotion-focused coping strategies throughout the coping process, the specific interpretation of the broad categories of coping such as "active coping". The last question specifically addresses the individual nature of generalist approaches to coping. Understanding the specific interpretations of "Active Coping" into tangible activities and seeking patterns would provide a depth of knowledge that would allow specific interventions to be designed for helping new project managers learn to cope well and understand what behaviours or actions to be alert for as potentially destructive.

3. **Outcomes of coping - both adaptive and maladaptive**

The model of coping used to structure this research is the Transactional Theory of Coping. This model, as discussed in section 4.1.2, is limited to the cognitive appraisal process individual go through to select and apply coping strategies to deal with individual stressful events. The theory specifically disconnects coping strategy selection with the outcome of the selected strategies. Future research should consider exploring in more depth the adaptive or maladaptive outcomes from the use of

Planning and Active Coping by project managers across the various domains of work, home and personal health. Although it is popularly believed, and supported by some research, that use of problem-focused coping strategies is more adaptive than emotion-focused coping particularly where actual control is evident, it would be good to empirically validate that this is the case for project managers. It may be that although there is a consistency to the use of Acceptance, Planning and Active Coping these may not be the most effective coping strategies in all situations. There would also be value in exploring the level of stress felt by project managers and relating this to the use of Acceptance, Planning and Active Coping. Future research may like to consider the health outcomes and general life satisfaction levels of project managers through more quantitative and qualitative research.

Finally, beyond the scope of stress and coping, future research may want to explore the psychological tendencies in project managers. Research exploring the question of 'are there central personality tendencies for project managers?' could examine beyond the finding of this study whether project managers have a higher sense of general self-efficacy into locus of control, neuroticism, optimism and other such constructs.

7.7 Recommendations for Practice

There are three (3) groups for whom there are potential implications for practice; project managers, employers and the educational community. Specific recommendations for practice are made for each group.

1. Project Managers

Project managers are the group most able to respond to and incorporate the findings from this research into their practice. The findings from this research are positive for project managers in that although the work they do is undeniably stressful they are well equipped for addressing the issues brought about by their projects by attacking the stressful situation directly through Active Coping and Planning. The consistency with which project managers attempt to manage stress at work, home and with their personal health is far greater than for other groups reported in the literature review. For stressful situations arising at work a focused approach using problem focused coping strategies is likely to be successful for both the project manager and other relevant stakeholders generally resulting in a reduction of stress. In a project

environment solving the problem at hand is likely to be the best way to alleviate individual, team and project stress.

When dealing with personal health stressors the primary participant in the stressful event is the project manager and by focusing on the problem at hand they will be able to manage their own stress. By doing so and remaining calm and in control they will most likely provide a calming assurance to the other key stakeholders, usually family and close friends.

The same arguments however are not necessarily true for managing stressful situations at home. In the home environment where other stakeholders are likely to being using a wider range of emotion focused coping strategies, continually relying on a narrow and repetitive selection of problem-focused coping strategies may inflame stressful situations causing conflict between the various stakeholders. It is recommended that project managers consider the potential effects of their reliance on Planning and Active Coping on others involved in home based stressful situations.

It is widely acknowledged that having a good sense of self awareness is critical to becoming a good manager and/or executive within business today. Managers are encouraged to understand their own leadership styles, develop their emotional intelligence, and understand behavioural patterns. The findings in this research provide the basis for developing self awareness with regard to stressors that affect us as individuals and how we are likely to attempt to cope with them. Armed with this knowledge individual practitioners can widen their scope of available coping strategies and consciously choose alternatives that are likely to be more successful in reducing stress.

2. Employers

Health, Safety and Environment (HSE) is a top priority for many organisations around the world, particularly those organisations that operate in physically dangerous conditions. However there is a relatively unexplored component of the Health aspect to HSE, namely psychologically dangerous conditions. It is recommended that employers use the results of this research to firstly acknowledge that projects and work in general are stressful environments that have HSE implications. Measures can be taken to prevent burn out through too much stress of key project resources through

active stress monitoring and workload balancing. Secondly employers can take the results of this research to shape their training and development programs for individual project managers as well as project teams. These programs should be focused around developing a self awareness of what stressors are triggers for specific individuals, how they are likely to attempt to cope with them and how to develop alternative coping strategies that can be matched to specific situations to maximize the likelihood of successful outcomes.

3. Educational Community

The recommendations for individuals and employers both suggest the need for educational programs for project managers to develop a wider range of coping strategies as well as matching capabilities of coping strategy and specific stressors. It is recommended that the educational community look for ways in which to incorporate self awareness of stress management into existing curriculums that deal with developing self awareness of leadership style, emotional intelligence and general behaviours. The implications for educational providers fits closely within the general management and work readiness components of existing curriculum where content is directed at preparing students to cope in a complex business environment where success hinges more on the individuals' ability to adapt their behaviour to match the situation than it does on their specific areas of technical excellence.

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9 APPENDIX A – COPING INSTRUMENTS

9.1 Ways of Coping (Revised)

Please read each item below and indicate, by circling the appropriate category, to what extent you used it *in the situation you have just described*

	Not Used	Used Somewhat	Used Quite a Bit	Used a Great Deal
1. Just concentrated on what I had to do next – the next step.	0	1	2	3
2. I tried to analyse the problem in order to understand it better.	0	1	2	3
3. Turned to work or substitute activity to take my mind off things.	0	1	2	3
4. I felt that time would make a difference – the only thing to do was to wait.	0	1	2	3
5. Bargained or compromised to get something positive from the situation.	0	1	2	3
6. I did something which I didn't think would work, but at least I was doing something.	0	1	2	3
7. Tried to get the person responsible to change his or her mind.	0	1	2	3
8. Talked to someone to find out more about the situation.	0	1	2	3
9. Criticized or lectured myself.	0	1	2	3
10. Tried not to burn my bridges, but leave things open somewhat.	0	1	2	3
11. Hoped a miracle would happen	0	1	2	3
12. Went along with fate; sometimes I just have bad luck.	0	1	2	3
13. Went on as if nothing had happened.	0	1	2	3
14. I tried to keep my feelings to myself.	0	1	2	3
15. Looked for the silver lining, so to speak; tried to look on the bright side of things.	0	1	2	3
16. Slept more than usual.	0	1	2	3
17. I expressed anger to the person(s) who caused the problem.	0	1	2	3
18. Accepted sympathy and understanding from someone.	0	1	2	3
19. I told myself things that helped me to feel better	0	1	2	3
20. I was inspired to do something creative	0	1	2	3
21. Tried to forget the whole thing.	0	1	2	3
22. I got professional help.	0	1	2	3
23. Changed or grew as a person in a good way	0	1	2	3
24. I waited to see what would happen before doing anything.	0	1	2	3
25. I apologized or did something to make up.	0	1	2	3
26. I made a plan of action and followed it.	0	1	2	3

27. I accepted the next best thing to what I wanted	0	1	2	3
28. I let my feelings out somehow.	0	1	2	3
29. Realized I brought the problem on myself.	0	1	2	3
30. I came out of the experience better than when I went in.	0	1	2	3
31. Talked to someone who could do something concrete about the problem	0	1	2	3
32. Got away from it for a while; tried to rest or take a vacation	0	1	2	3
33. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc.	0	1	2	3
34. Took a big chance or did something very risky.	0	1	2	3
35. I tried not to act too hastily or follow my hunch.	0	1	2	3
36. Found new faith.	0	1	2	3
37. Maintained my pride and kept a stiff upper lip.	0	1	2	3
38. Rediscovered what is important in life.	0	1	2	3
39. Changed something so things would turn out all right.	0	1	2	3
40. Avoided being with people in general	0	1	2	3
41. Didn't let it get to me; refused to think too much about it.	0	1	2	3
42. I asked a relative or friend I respected for advise	0	1	2	3
43. Kept others from knowing how bad things were.	0	1	2	3
44. Made light of the situation; refused to get too serious about it.	0	1	2	3
45. Talked to someone about how I was feeling.	0	1	2	3
46. Stood my ground and fought for what I wanted.	0	1	2	3
47. Took it out on other people.	0	1	2	3
48. Drew on my past experiences; I was in a similar situation before	0	1	2	3
49. I knew what had to be done, so I doubled my efforts to make things work	0	1	2	3
50. Refused to believe that it had happened	0	1	2	3
51. I made a promise to myself that things would be different next time.	0	1	2	3
52. Came up with a couple of different solutions to the problem	0	1	2	3
53. Accepted it, since nothing could be done	0	1	2	3
54. I tried to keep my feeling from interfering with other things too much.	0	1	2	3
55. Wished that I could change what had happened or how I felt	0	1	2	3
56. I changed something about myself.	0	1	2	3
57. I daydreamed or imagined a better time or place than the one I was in.	0	1	2	3

58. Wished that the situation would go away or somehow be over with.	0	1	2	3
59. Had fantasies or wishes about how things might turn out	0	1	2	3
60. I prayed	0	1	2	3
61. I prepared myself for the worst	0	1	2	3
62. I went over in my mind what I would say or do	0	1	2	3
63. I thought about how a person I admire would handle this situation and used that as a model.	0	1	2	3
64. I tried to see things from the other person's point of view	0	1	2	3
65. I reminded myself how much worse things could be	0	1	2	3
66. I jogged or exercised	0	1	2	3
67. I tried something entirely different from any of the above. (please describe)	0	1	2	3

9.2 COPE (complete version)

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by blackening one number on your answer sheet for each, using the response choices listed just below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1 = I usually don't do this at all
2 = I usually do this a little bit
3 = I usually do this a medium amount
4 = I usually do this a lot

1. I try to grow as a person as a result of the experience.
2. I turn to work or other substitute activities to take my mind off things.
3. I get upset and let my emotions out.
4. I try to get advice from someone about what to do.
5. I concentrate my efforts on doing something about it.
6. I say to myself "this isn't real."
7. I put my trust in God.
8. I laugh about the situation.
9. I admit to myself that I can't deal with it, and quit trying.
10. I restrain myself from doing anything too quickly.

11. I discuss my feelings with someone.
12. I use alcohol or drugs to make myself feel better.
13. I get used to the idea that it happened.
14. I talk to someone to find out more about the situation.
15. I keep myself from getting distracted by other thoughts or activities.
16. I daydream about things other than this.
17. I get upset, and am really aware of it.
18. I seek God's help.
19. I make a plan of action.
20. I make jokes about it.

21. I accept that this has happened and that it can't be changed.
22. I hold off doing anything about it until the situation permits.
23. I try to get emotional support from friends or relatives.
24. I just give up trying to reach my goal.
25. I take additional action to try to get rid of the problem.

26. I try to lose myself for a while by drinking alcohol or taking drugs.
27. I refuse to believe that it has happened.
28. I let my feelings out.
29. I try to see it in a different light, to make it seem more positive.
30. I talk to someone who could do something concrete about the problem.

31. I sleep more than usual.
32. I try to come up with a strategy about what to do.
33. I focus on dealing with this problem, and if necessary let other things slide a little.
34. I get sympathy and understanding from someone.
35. I drink alcohol or take drugs, in order to think about it less.
36. I kid around about it.
37. I give up the attempt to get what I want.
38. I look for something good in what is happening.
39. I think about how I might best handle the problem.
40. I pretend that it hasn't really happened.

41. I make sure not to make matters worse by acting too soon.
42. I try hard to prevent other things from interfering with my efforts at dealing with this.
43. I go to movies or watch TV, to think about it less.
44. I accept the reality of the fact that it happened.
45. I ask people who have had similar experiences what they did.
46. I feel a lot of emotional distress and I find myself expressing those feelings a lot.
47. I take direct action to get around the problem.
48. I try to find comfort in my religion.
49. I force myself to wait for the right time to do something.
50. I make fun of the situation.

51. I reduce the amount of effort I'm putting into solving the problem.
52. I talk to someone about how I feel.
53. I use alcohol or drugs to help me get through it.
54. I learn to live with it.
55. I put aside other activities in order to concentrate on this.
56. I think hard about what steps to take.
57. I act as though it hasn't even happened.
58. I do what has to be done, one step at a time.
59. I learn something from the experience.
60. I pray more than usual.

Scales (sum items listed, with no reversals of coding):

Positive reinterpretation and growth: 1, 29, 38, 59
Mental disengagement: 2, 16, 31, 43
Focus on and venting of emotions: 3, 17, 28, 46
Use of instrumental social support: 4, 14, 30, 45
Active coping: 5, 25, 47, 58
Denial: 6, 27, 40, 57
Religious coping: 7, 18, 48, 60
Humor: 8, 20, 36, 50
Behavioral disengagement: 9, 24, 37, 51
Restraint: 10, 22, 41, 49
Use of emotional social support: 11, 23, 34, 52
Substance use: 12, 26, 35, 53
Acceptance: 13, 21, 44, 54
Suppression of competing activities: 15, 33, 42, 55
Planning: 19, 32, 39, 56

9.3 Brief COPE

These items deal with ways you've been coping with the stress in your life since you found out you were going to have to have this operation. There are many ways to try to deal with problems. These items ask what you've been doing to cope with this one. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

1 = I haven't been doing this at all
2 = I've been doing this a little bit
3 = I've been doing this a medium amount
4 = I've been doing this a lot

1. I've been turning to work or other activities to take my mind off things
2. I've been concentrating my efforts on doing something about the situation I'm in
3. I've been saying to myself "this isn't real."
4. I've been using alcohol or other drugs to make myself feel better
5. I've been getting emotional support from others
6. I've been giving up trying to deal with it
7. I've been taking action to try to make the situation better
8. I've been refusing to believe that it has happened
9. I've been saying things to let my unpleasant feelings escape
10. I've been getting help and advice from other people
11. I've been using alcohol or other drugs to help me get through it
12. I've been trying to see it in a different light, to make it seem more positive
13. I've been criticizing myself
14. I've been trying to come up with a strategy about what to do
15. I've been getting comfort and understanding from someone
16. I've been giving up the attempt to cope
17. I've been looking for something good in what is happening
18. I've been making jokes about it
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping
20. I've been accepting the reality of the fact that it has happened
21. I've been expressing my negative feelings
22. I've been trying to find comfort in my religion or spiritual beliefs
23. I've been trying to get advice or help from other people about what to do
24. I've been learning to live with it
25. I've been thinking hard about what steps to take
26. I've been blaming myself for things that happened
27. I've been praying or meditating
28. I've been making fun of the situation

Scales are computed as follows (with no reversals of coding):

Self-distraction, items 1 and 19

Active coping, items 2 and 7

Denial, items 3 and 8

Substance use, items 4 and 11

Use of emotional support, items 5 and 15

Use of instrumental support, items 10 and 23

Behavioral disengagement, items 6 and 16

Venting, items 9 and 21

Positive reframing, items 12 and 17

Planning, items 14 and 25

Humor, items 18 and 28

Acceptance, items 20 and 24

Religion, items 22 and 27

Self-blame, items 13 and 26

10 APPENDIX B – SELF EFFICACY INSTRUMENTS

10.1 The Self Self-Efficacy Scale – Sherer

Subscales

Three subscales are reported by Bosscher and Smit

1. Initiative: Items 1-3
2. Effort: Items 4-8
3. Persistence: Items 9-12

Reliability

12-item scale: Internal Consistency

Cronbach alpha (whole scale) = 0.69

Cronbach alpha (initiative) = 0.64

Cronbach alpha (effort) = 0.63

Cronbach alpha (persistence) = 0.64

Scale Items

Initiative

- If something looks too complicated, I will not even bother to try it
- I avoid trying to learn new things when they look too difficult
- When trying something new, I soon give up if I am not initially successful

Effort

- When I make plans, I am certain I can make them work
- If I can't do a job the first time, I keep trying until I can
- When I have something unpleasant to do, I stick to it until I finish it
- When I decide to do something, I go right to work on it
- Failure just makes me try harder

Persistence

- When I set important goals for myself, I rarely achieve them
- I do not seem to be capable of dealing with most problems that come up in my life
- When unexpected problems occur, I don't handle them very well
- I feel insecure about my ability to do things

(Sherer et al., 1982)

10.2 New Generalised Self Efficacy Scale

By Chen, Gully & Eden

Response format = Likert Scale

1= Strongly Disagree

5=Strongly Agree

4. I will be able to achieve most of the goals that I have set for myself.
5. When facing difficult tasks, I am certain that I will accomplish them.
6. In general, I think that I can obtain outcomes that are important to me.
7. I believe I can succeed at most any endeavor to which I set my mind.
8. I will be able to successfully overcome many challenges.
9. I am confident that I can perform effectively on many different tasks.
10. Compared to other people, I can do most tasks very well.
11. Even when things are tough, I can perform quite well.

10.3 English Adaptation of the General Self-Efficacy Scale

By Ralf Schwarzer and Matthias Jerusalem

Response Format

1. Not at all true
2. Barely true
3. Moderately true
4. Exactly true

Questions

1. I can always manage to solve difficult problems if I try hard enough
2. If someone opposes me, I can find a means and ways to get what I want
3. It is easy for me to stick to my aims and accomplish my goals
4. I am confident that I could deal efficiently with unexpected events
5. Thanks to my resourcefulness, I know how to handle unforseen situations
6. I can solve most problems if I invest the necessary effort
7. I can remain calm when facing difficulties because I can rely on my coping abilities
8. When I am confronted with a problem, I can usually find several solutions
9. If I am in trouble, I can usually think of something to do
10. No matter water come my way, I'm usually able to handle it

11 APPENDIX C – GAPPS PROJECT MANAGER STANDARD

11.1 Performance Criteria

Units	Elements	Performance Criteria
Manage Stakeholder Relationships	1.1 Ensure that stakeholder interests are identified and addressed.	1.1.1 Relevant stakeholders are determined. 1.1.2 Stakeholder interests are investigated and documented. 1.1.3 Stakeholder interests are considered when making project decisions. 1.1.4 Actions to address differing interests are implemented.
	1.2 Promote effective individual and team performance.	1.2.1 Interpersonal skills are applied to encourage individuals and teams to perform effectively. 1.2.2 Individual project roles are defined, documented, communicated, assigned, and agreed to. 1.2.3 Individual and team behavioural expectations are established. 1.2.4 Individual and team performance is monitored and feedback provided. 1.2.5 Individual development needs and opportunities are recognised and addressed.

	1.3 Manage stakeholder communications.	1.3.1 Communication needs of stakeholders are identified and documented. 1.3.2 Communication method, content, and timing is agreed to by relevant stakeholders. 1.3.3 Information is communicated as planned, and variances are identified and addressed.
	1.4 Facilitate external stakeholder participation.	1.4.1 External stakeholder participation is planned, documented, and communicated. 1.4.2 External stakeholder participation is supported as planned, and variances are addressed.

Manage Development of the Plan for the Project	2.1 Define the work of the project.	2.1.1 A shared understanding of desired project outcomes is agreed to with relevant stakeholders. 2.1.2 Processes and procedures to support the management of the project are identified, documented, and communicated to relevant stakeholders. 2.1.3 Work-items required to accomplish the product of the project are determined. 2.1.4 The work-items and completion criteria are agreed to by relevant stakeholders. 2.1.5 Assumptions, constraints, and exclusions are identified and documented. 2.1.6 Relevant knowledge gained from prior projects is incorporated into the plan for the project where feasible.
	2.2 Ensure the plan for the project reflects relevant legal requirements.	2.2.1 Relevant legal requirements are identified, documented, and communicated to relevant stakeholders. 2.2.2 Potential for conflicts caused by legal requirements are identified and addressed in the plan for the project.

	2.3 Document risks and risk responses for the project.	2.3.1 Risks are identified in consultation with relevant stakeholders. 2.3.2 Risk analysis techniques are used to evaluate risks and then prioritise them for further analysis and response planning. 2.3.3 Responses to risks are identified and agreed to by relevant stakeholders.
	2.4 Confirm project success criteria.	2.4.1 Measurable project success criteria are identified and documented. 2.4.2 Project success criteria are agreed to by relevant stakeholders.
	2.5 Develop and integrate project baselines.	2.5.1 Resource requirements are determined. 2.5.2 Schedule is developed based on resource requirements, resource availability, and required sequence of work-items. 2.5.3 Budget is developed based on resource requirements. 2.5.4 Conflicts and inconsistencies in the plan for the project are addressed. 2.5.5 The plan for the project is approved by authorised stakeholders and communicated to relevant stakeholders.

Manage Project Progress	3.1 Monitor, evaluate, and control project performance.	3.1.1 Performance of the project is measured, recorded, evaluated, and reported against the project baselines. 3.1.2 Processes and procedures are monitored and variances addressed. 3.1.3 Completed work-items are reviewed to ensure that agreed completion criteria were met. 3.1.4 Corrective action is taken as needed in support of meeting project success criteria.
	3.2 Monitor risks to the project.	3.2.1 Identified risks are monitored. 3.2.2 Changes to the external environment are observed for impact to the project. 3.2.3 Applicable legal requirements are monitored for breaches and conflicts. 3.2.4 Actions are taken as needed.
	3.3 Reflect on practice.	3.3.1 Feedback on personal performance is sought from relevant stakeholders and addressed. 3.3.2 Lessons learned are identified and documented.

Manage Product Acceptance	4.1 Ensure that the product of the project is defined.	4.1.1 Desired characteristics of the product of the project are identified in consultation with relevant stakeholders. 4.1.2 Characteristics of the product of the project are documented and agreed to by relevant stakeholders.
	4.2 Ensure that changes to the product of the project are monitored and controlled.	4.2.1 Variances from agreed product characteristics are identified and addressed. 4.2.2 Requests for changes to the product of the project are documented, evaluated, and addressed in accordance with the change control processes for the project. 4.2.3 Approved product changes are implemented.
	4.3 Secure acceptance of the product of the project.	4.3.1 The product of the project is evaluated against the latest agreed characteristics and variances addressed where necessary. 4.3.2 The product of the project is transferred to identified stakeholders and accepted.
Manage Project Transitions	5.1 Manage project start-up.	5.1.1 Authorisation to expend resources is obtained from the appropriate stakeholders. 5.1.2 Start-up activities are planned and conducted.

	5.2 Manage transition between project phases.	5.2.1 Acceptance of the outputs of a prior phase is obtained from the relevant stakeholders. 5.2.2 Authorisation to begin work on a subsequent phase is obtained from the appropriate stakeholders. 5.2.3 Transition activities are planned and conducted.
	5.3 Manage project closure.	5.3.1 Closure activities are planned and conducted. 5.3.2 Project records are finalised, signed off, and stored in compliance with processes and procedures.
Evaluate and Improve Project Performance	6.1 Develop a plan for project evaluation.	6.1.1 Purpose, focus, and criteria of evaluation are determined. 6.1.2 Relevant evaluation techniques are determined.
	6.2 Evaluate the project in accordance with plan.	6.2.1 Performance data is collected and analysed in accordance with the evaluation plan. 6.2.2 Evaluation process engages relevant stakeholders.

	6.3 Capture and apply learning.	6.3.1 Knowledge sharing and skill transfer is encouraged among relevant stakeholders. 6.3.2 Results of evaluations are documented and made available for organisational learning. 6.3.3 Potential improvements are identified, documented and communicated to relevant stakeholders. 6.3.4 Improvements agreed for this project are applied.

11.2 CIFTER – Crawford Ishikura Factor Table for Evaluating Roles

The CIFTER factors are described in the paragraphs below. Each of the factors is given equal weight when evaluating the management complexity of a project.

1. ***Stability of the overall project context.*** The project context includes the project life-cycle, the stakeholders, the degree to which the applicable methods and approaches are known, and the wider socioeconomic environment. When the project context is unstable — phase deliverables are poorly defined, scope changes are frequent and significant, team members are coming and going, applicable laws and regulations are being modified — the project management challenge increases.

Note: some aspects of "technical complexity" such as dealing with unproven concepts would be considered here.

2. ***Number of distinct disciplines, methods, or approaches involved in performing the project.*** Most projects involve more than one management or technical discipline; some projects involve a large number of different disciplines. For example, a project to develop a new drug could include medical researchers, marketing staff, manufacturing experts, lawyers, and others. Since each discipline tends to approach its part of the project in a different way, more disciplines means a project that is relatively more difficult to manage.

Note: some aspects of "technical complexity" such as dealing with a product with many interacting elements would be considered here.

3. ***Magnitude of legal, social, or environmental implications from performing the project.*** This factor addresses the potential external impact of the project. For example, the potential for catastrophic failure means that the implications of constructing a nuclear power plant close to a major urban centre will likely be much greater than those of constructing an identical plant in a remote area. The management complexity of the urban project will be higher due to the need to deal with a larger number of stakeholders and a more diverse stakeholder population.

4. ***Overall expected financial impact (positive or negative) on the project's stakeholders.*** This factor accounts for one aspect of the traditional measure of "size," but does so in relative terms. For example, a project manager in a consumer electronics start-up is subject to more scrutiny than a project manager doing a similarly sized project for a computer manufacturer with operations around the globe.

Note: where the impact on different stakeholders is different, this factor should be rated according to the impact on the primary stakeholders.

5. ***Strategic importance of the project to the organisation or organisations involved.*** This factor addresses yet another aspect of "size," and again deals with it in relative rather than absolute terms. While every project should be aligned with the organisation's strategic direction, not every project can be of equal importance to the organisation or organisations involved.

Note: as with financial impact, if the strategic importance for different stakeholders is different, this factor should be rated according to the strategic importance for the primary stakeholders.

6. ***Stakeholder cohesion regarding the characteristics of the product of the project.*** When all or most stakeholders are in agreement about the characteristics of the product of the project, they tend to be in agreement about the expected outcomes as well. When they are not in agreement, or when the benefits of a product with a particular set of characteristics are unknown or uncertain, the project management challenge is significant.

7. ***Number and variety of interfaces between project and other organisational entities.*** In the same way that a large number of different disciplines on a project can create a management challenge, a large number of different organisations can as well.

Note: issues of culture and language would be addressed here.

Crawford-Ishikura Factor Table for Evaluating Roles (CIFTER)

Project Management Complexity Factor	Descriptor and Points			
8. Stability of the overall project context	Very high (1)	High (2)	Moderate (3)	Low (4)
9. Number of distinct disciplines, methods, or approaches involved in performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
10. Magnitude of legal, social, or environmental implications from performing the project	Low (1)	Moderate (2)	High (3)	Very high (4)
11. Overall expected financial impact (positive or negative) on the project's stakeholders	Low (1)	Moderate (2)	High (3)	Very high (4)
12. Strategic importance of the project to the organisation or organisations involved	Very low (1)	Low (2)	Moderate (3)	High (4)
13. Stakeholder cohesion regarding the characteristics of the product of the project	High (1)	Moderate (2)	Low (3)	Very low (4)
14. Number and variety of interfaces between the project and other organisational entities	Very low (1)	Low (2)	Moderate (3)	High (4)

The CIFTER Ratings

The points gained for each of the seven (7) factors are totalled and the following grading system applies.

- Point total less than 11: this project *cannot* be used to provide evidence for a GAPPS compliant performance assessment.
- Point total 12 or higher: this project *can* be used to provide evidence for a GAPPS compliant performance assessment at Global Level 1.
- Point total 19 or higher: this project *can* be used to provide evidence for a GAPPS compliant performance assessment at Global Level 2.

12 DETAILED STATISTICS

12.1.1 CIFTER Factor Analysis

Table 109 - Correlation Matrix (CIFTER) Factor Analysis

		PCQ02	PCQ03	PCQ04	PCQ05	PCQ06	PCQ07	PCQ08
Correlation	PCQ02	1.000	.025	.070	.082	.001	.341	.116
	PCQ03	.025	1.000	.359	.368	.288	.007	.488
	PCQ04	.070	.359	1.000	.396	.309	.006	.395
	PCQ05	.082	.368	.396	1.000	.397	-.058	.360
	PCQ06	.001	.288	.309	.397	1.000	-.093	.373
	PCQ07	.341	.007	.006	-.058	-.093	1.000	.053
	PCQ08	.116	.488	.395	.360	.373	.053	1.000

Table 110 - KMO and Bartlett's Test (CIFTER) Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.749
Bartlett's Test of Sphericity	Approx. Chi-Square	476.981
	df	21
	Sig.	.000

Table 111 - Total Variance Explained (CIFTER) Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.509	35.849	35.849	2.509	35.849	35.849
2	1.361	19.442	55.291	1.361	19.442	55.291
3	.769	10.992	66.284			
4	.671	9.584	75.868			
5	.633	9.050	84.917			
6	.583	8.329	93.246			
7	.473	6.754	100.000			

Extraction Method: Principal Component Analysis.

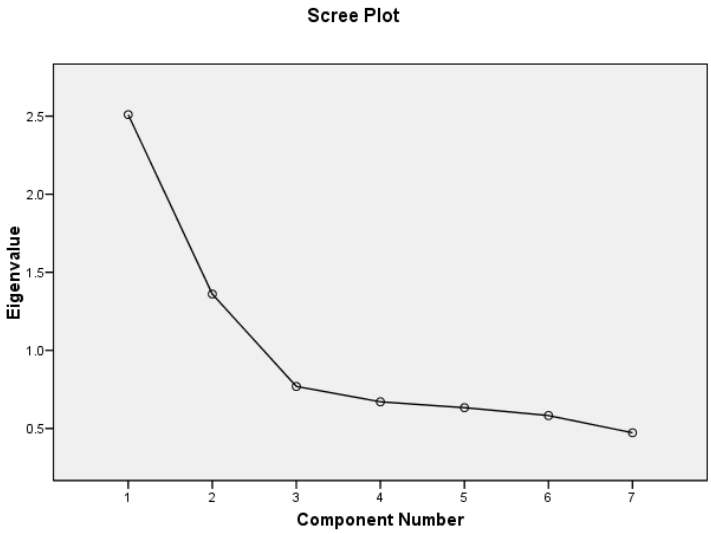

Figure 65 - Scree Plot (CIFTER) Factor Analysis

12.1.2 Individual Competency (CQSUM) Factor Analysis

Table 112 - Correlation Matrix (CQSUM) Factor Analysis

		CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
Correlation	CQ1	1.000	.749	.693	.600	.707	.549
	CQ2	.749	1.000	.795	.720	.717	.629
	CQ3	.693	.795	1.000	.740	.717	.680
	CQ4	.600	.720	.740	1.000	.691	.540
	CQ5	.707	.717	.717	.691	1.000	.629
	CQ6	.549	.629	.680	.540	.629	1.000

Table 113 - KMO and Bartlett's Test (CQSUM) Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.903
Bartlett's Test of Sphericity	Approx. Chi-Square	955.738
	df	15
	Sig.	.000

Table 114 - Total Variance Explained (CQSUM) Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.396	73.262	73.262	4.396	73.262	73.262
2	.487	8.113	81.375			
3	.409	6.810	88.185			
4	.307	5.109	93.294			
5	.210	3.504	96.798			
6	.192	3.202	100.000			

Extraction Method: Principal Component Analysis.

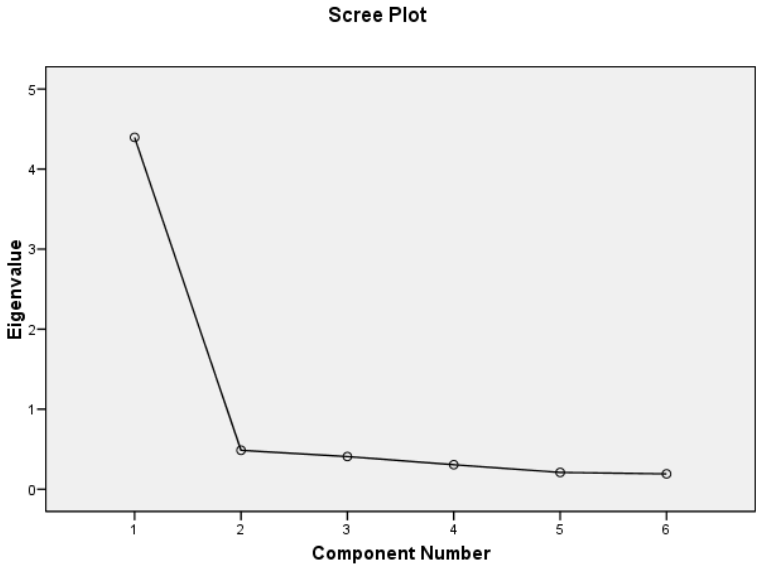

Figure 66 - Scree Plot (CQSUM) Factor Analysis

12.1.3 Brief COPE Factor Analysis – work-based stressor

Table 115 - Correlation Matrix (Brief COPE Work-based Stressor) Factor Analysis

		CSW_SD	CSW_AC	CSW_D	CSW_SU	CSW_UES	CSW_UIS	CSW_BD	CSW_V	CSW_PR	CSW_P	CSW_H	CSW_A	CSW_R	CSW_SB
Correlation	CSW_SD	1.000	.087	.175	.162	.302	.071	.139	.226	.203	-.020	.057	.147	.233	.048
	CSW_AC	.087	1.000	-.012	-.145	.126	.314	-.231	.149	.269	.672	.101	.243	.057	-.012
	CSW_D	.175	-.012	1.000	.231	.229	.157	.442	.227	-.008	-.062	.048	-.023	.169	.312
	CSW_SU	.162	-.145	.231	1.000	.049	-.060	.167	.232	-.028	-.101	-.003	-.061	-.050	.203
	CSW_UES	.302	.126	.229	.049	1.000	.528	.191	.408	.200	.113	.008	.118	.296	.019
	CSW_UIS	.071	.314	.157	-.060	.528	1.000	.098	.289	.194	.311	.069	.039	.161	.107
	CSW_BD	.139	-.231	.442	.167	.191	.098	1.000	.153	-.027	-.165	.159	-.033	.164	.215
	CSW_V	.226	.149	.227	.232	.408	.289	.153	1.000	-.010	.105	.177	.001	.114	.157
	CSW_PR	.203	.269	-.008	-.028	.200	.194	-.027	-.010	1.000	.267	.193	.340	.225	.000
	CSW_P	-.020	.672	-.062	-.101	.113	.311	-.165	.105	.267	1.000	.155	.326	.008	.059
	CSW_H	.057	.101	.048	-.003	.008	.069	.159	.177	.193	.155	1.000	.208	.048	.117
	CSW_A	.147	.243	-.023	-.061	.118	.039	-.033	.001	.340	.326	.208	1.000	.061	-.014
	CSW_R	.233	.057	.169	-.050	.296	.161	.164	.114	.225	.008	.048	.061	1.000	.078
	CSW_SB	.048	-.012	.312	.203	.019	.107	.215	.157	.000	.059	.117	-.014	.078	1.000

Table 116 - KMO and Bartlett's Test (Brief COPE Work-based Stressor) Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.669
Bartlett's Test of Sphericity	Approx. Chi-Square	600.328
	df	91
	Sig.	.000

Table 117 - Total Variance Explained (Brief COPE Work-based Stressor) Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.824	20.175	20.175	2.824	20.175	20.175
2	2.247	16.047	36.221	2.247	16.047	36.221
3	1.285	9.182	45.403	1.285	9.182	45.403
4	1.260	8.997	54.400	1.260	8.997	54.400
5	1.043	7.449	61.848	1.043	7.449	61.848
6	.925	6.607	68.455			
7	.783	5.594	74.049			
8	.732	5.231	79.280			
9	.654	4.670	83.950			
10	.628	4.486	88.435			
11	.517	3.696	92.131			
12	.466	3.330	95.462			
13	.351	2.508	97.970			
14	.284	2.030	100.000			

Extraction Method: Principal Component Analysis.

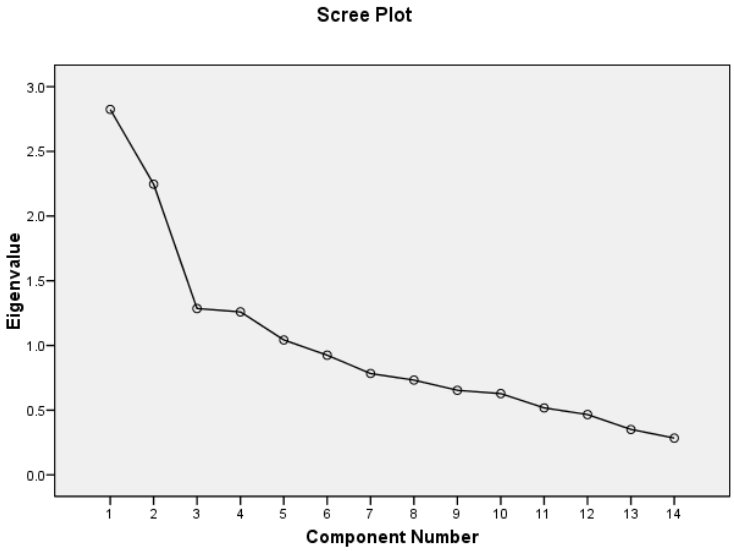

Figure 67 - Scree Plot (Brief COPE Work-based Stressor) Factor Analysis

Table 118 - Rotated Component Matrix (Brief COPE Work-based Stressor) Factor Analysis

	Component	
	1	2
CSW_AC	.781	
CSW_P	.777	
CSW_PR	.576	
CSW_A	.533	
CSW_UIS	.523	.374
CSW_H		
CSW_D		.688
CSW_BD		.647
CSW_UES	.390	.579
CSW_V		.570
CSW_SD		.455
CSW_SB		.440
CSW_SU		.429
CSW_R		.396

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

Table 119 - Total Variance Explained Rotated Solution (Brief Cope Work-based Stressor)

	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	2.571	18.367	18.367
2	2.500	17.854	36.221

Extraction Method: Principal Component Analysis.

12.1.4 Brief COPE Factor Analysis – home-based stressor

Table 120 - Correlation Matrix (Brief COPE Home-based Stressor) Factor Analysis

		CSH_SD	CSH_AC	CSH_D	CSH_SU	CSH_UES	CSH_UIS	CSH_BD	CSH_V	CSH_PR	CSH_P	CSH_H	CSH_A	CSH_R	CSH_SB
Correlation	CSH_SD	1.000	-.017	.116	.188	.258	.128	.232	.243	.113	.000	.145	.184	.307	.148
	CSH_AC	-.017	1.000	-.010	-.076	.166	.300	-.232	.118	.422	.693	.222	.179	.110	.016
	CSH_D	.116	-.010	1.000	.310	.054	.155	.320	.249	-.134	.048	-.076	-.193	.001	.253
	CSH_SU	.188	-.076	.310	1.000	.022	.004	.164	.235	-.151	.024	-.032	-.071	-.119	.296
	CSH_UES	.258	.166	.054	.022	1.000	.583	-.036	.184	.330	.239	.092	.297	.262	.170
	CSH_UIS	.128	.300	.155	.004	.583	1.000	-.074	.287	.216	.399	.158	.094	.168	.121
	CSH_BD	.232	-.232	.320	.164	-.036	-.074	1.000	.137	-.115	-.148	-.052	-.056	.062	.160
	CSH_V	.243	.118	.249	.235	.184	.287	.137	1.000	.070	.221	.259	.049	.037	.202
	CSH_PR	.113	.422	-.134	-.151	.330	.216	-.115	.070	1.000	.367	.386	.367	.203	-.031
	CSH_P	.000	.693	.048	.024	.239	.399	-.148	.221	.367	1.000	.157	.193	.094	.096
	CSH_H	.145	.222	-.076	-.032	.092	.158	-.052	.259	.386	.157	1.000	.263	.046	-.065
	CSH_A	.184	.179	-.193	-.071	.297	.094	-.056	.049	.367	.193	.263	1.000	.124	-.058
	CSH_R	.307	.110	.001	-.119	.262	.168	.062	.037	.203	.094	.046	.124	1.000	.036
	CSH_SB	.148	.016	.253	.296	.170	.121	.160	.202	-.031	.096	-.065	-.058	.036	1.000

Table 121 - KMO and Bartlett's Test (Brief COPE Home-based Stressor) Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.691
Bartlett's Test of Sphericity	Approx. Chi-Square	673.919
	df	91
	Sig.	.000

Table 122 - Total Variance Explained (Brief COPE Home-based Stressor) Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.079	21.993	21.993	3.079	21.993	21.993
2	2.201	15.719	37.712	2.201	15.719	37.712
3	1.455	10.395	48.107	1.455	10.395	48.107
4	1.174	8.386	56.493	1.174	8.386	56.493
5	.942	6.726	63.219			
6	.898	6.418	69.637			
7	.775	5.533	75.170			
8	.713	5.096	80.265			
9	.630	4.502	84.768			
10	.554	3.958	88.726			
11	.515	3.682	92.407			
12	.482	3.445	95.853			
13	.308	2.198	98.051			
14	.273	1.949	100.000			

Extraction Method: Principal Component Analysis.

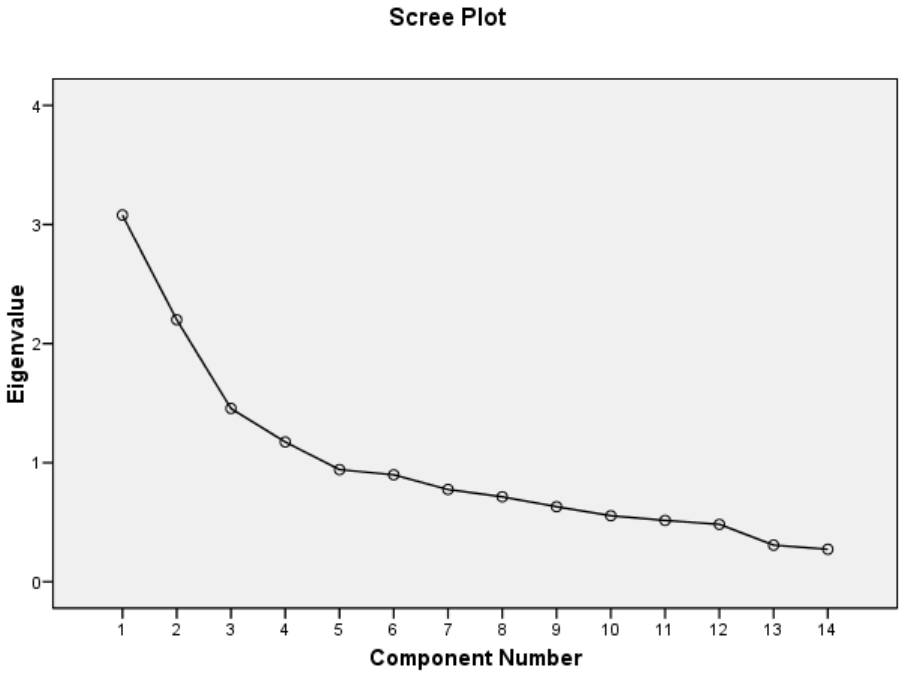

Figure 68 - Scree Plot (Brief COPE Home-based Stressor) Factor Analysis

Table 123 - Rotated Component Matrix (Brief COPE Home-based Stressor) Factor Analysis

	Component	
	1	2
CSH_PR	.708	
CSH_P	.698	
CSH_AC	.693	
CSH_UIS	.615	
CSH_UES	.607	
CSH_A	.508	
CSH_H	.478	
CSH_R	.342	
CSH_D		.674
CSH_SU		.609
CSH_SB		.580
CSH_V	.312	.544
CSH_BD		.541
CSH_SD		.483

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 3 iterations.

Table 124 - Total Variance Explained Rotated Solution (Brief Cope Home-based Stressor)

	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	3.051	21.790	21.790
2	2.229	15.922	37.712

Extraction Method: Principal Component Analysis.

12.1.5 Brief COPE Factor Analysis – Personal Health Stressor

Table 125 - Correlation Matrix (Brief COPE Personal Health Stressor) – Factor Analysis

		CSP_SD	CSP_AC	CSP_D	CSP_SU	CSP_UES	CSP_UIS	CSP_BD	CSP_V	CSP_PR	CSP_P	CSP_H	CSP_A	CSP_R	CSP_SB
Correlation	CSP_SD	1.000	.129	.173	.165	.298	.141	.128	.336	.235	.207	.220	.270	.225	.178
	CSP_AC	.129	1.000	-.151	.034	.509	.573	-.161	.219	.461	.679	.284	.500	.255	.025
	CSP_D	.173	-.151	1.000	.232	.080	.003	.143	.281	-.131	.016	-.039	-.036	-.031	.133
	CSP_SU	.165	.034	.232	1.000	.124	.087	.130	.314	-.061	.079	.186	.162	-.140	.210
	CSP_UES	.298	.509	.080	.124	1.000	.599	-.087	.449	.460	.439	.223	.437	.381	.065
	CSP_UIS	.141	.573	.003	.087	.599	1.000	-.151	.373	.355	.590	.268	.307	.274	.100
	CSP_BD	.128	-.161	.143	.130	-.087	-.151	1.000	.145	-.124	-.043	.006	.098	-.086	.290
	CSP_V	.336	.219	.281	.314	.449	.373	.145	1.000	.208	.265	.312	.317	.181	.194
	CSP_PR	.235	.461	-.131	-.061	.460	.355	-.124	.208	1.000	.403	.446	.331	.280	.066
	CSP_P	.207	.679	.016	.079	.439	.590	-.043	.265	.403	1.000	.245	.439	.251	.196
	CSP_H	.220	.284	-.039	.186	.223	.268	.006	.312	.446	.245	1.000	.297	.088	.229
	CSP_A	.270	.500	-.036	.162	.437	.307	.098	.317	.331	.439	.297	1.000	.165	.042
	CSP_R	.225	.255	-.031	-.140	.381	.274	-.086	.181	.280	.251	.088	.165	1.000	.027
	CSP_SB	.178	.025	.133	.210	.065	.100	.290	.194	.066	.196	.229	.042	.027	1.000

Table 126 - KMO and Bartlett's Test (Brief COPE Personal Health Stressor) – Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.796
Bartlett's Test of Sphericity	Approx. Chi-Square	739.644
	df	91
	Sig.	.000

Table 127 - Total Variance Explained (Brief COPE Personal Health Stressor) – Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.178	29.843	29.843	4.178	29.843	29.843
2	1.952	13.941	43.784	1.952	13.941	43.784
3	1.143	8.164	51.947	1.143	8.164	51.947
4	1.066	7.611	59.558	1.066	7.611	59.558
5	.945	6.752	66.310			
6	.882	6.302	72.613			
7	.679	4.850	77.463			
8	.675	4.821	82.284			
9	.559	3.995	86.278			
10	.506	3.611	89.890			
11	.472	3.375	93.264			
12	.401	2.868	96.132			
13	.297	2.123	98.256			
14	.244	1.744	100.000			

Extraction Method: Principal Component Analysis.

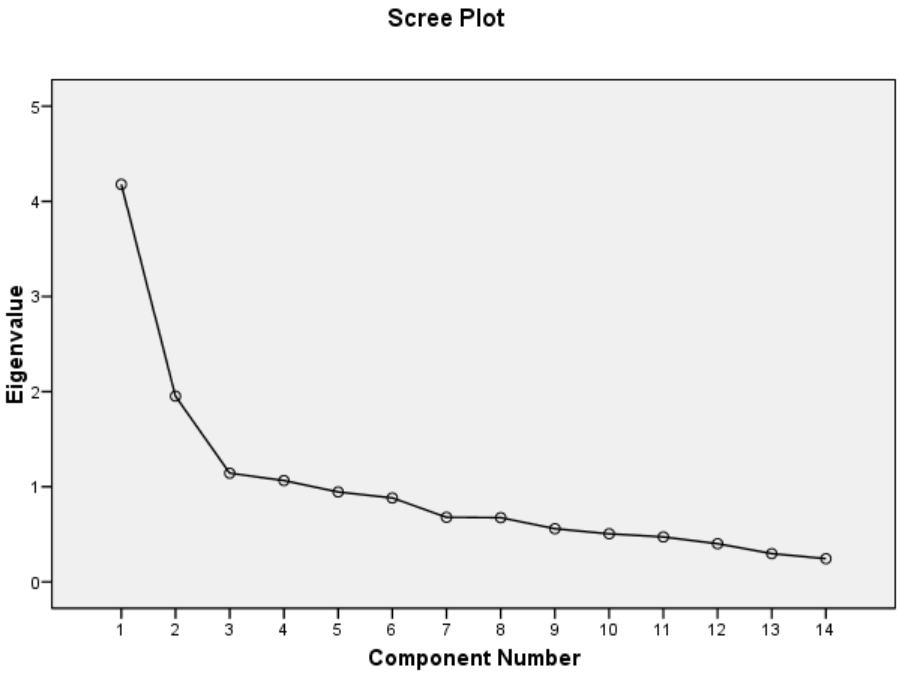

Figure 69 - Scree Plot (Brief COPE Personal Health Stressor) – Factor Analysis

Table 128 - Rotated Component Matrix (Brief COPE Personal Health Stressor) – Factor Analysis

	Component	
	1	2
CSP_AC	.815	
CSP_UES	.759	
CSP_UIS	.754	
CSP_P	.753	
CSP_PR	.690	
CSP_A	.613	
CSP_R	.478	
CSP_H	.464	
CSP_SU		.625
CSP_V	.435	.594
CSP_D		.580
CSP_BD		.563
CSP_SB		.556
CSP_SD	.328	.469

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

Table 129 - Total Variance Explained Rotated Solution (Brief COPE Personal Health Stressor)

	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	4.030	28.782	28.782
2	2.100	15.002	43.784

Extraction Method: Principal Component Analysis.

12.1.6 Factor Analysis – Generalised Self Efficacy

Table 130 - Correlation Matrix (GSE) - Factor Analysis

		GSE01	GSE02	GSE03	GSE04	GSE05	GSE06	GSE07	GSE08	GSE09	GSE10
Correlation	GSE01	1.000	.401	.410	.489	.429	.514	.463	.393	.388	.544
	GSE02	.401	1.000	.335	.338	.339	.381	.323	.319	.448	.351
	GSE03	.410	.335	1.000	.490	.370	.393	.356	.324	.379	.428
	GSE04	.489	.338	.490	1.000	.583	.449	.482	.451	.442	.562
	GSE05	.429	.339	.370	.583	1.000	.386	.440	.487	.380	.477
	GSE06	.514	.381	.393	.449	.386	1.000	.340	.485	.462	.460
	GSE07	.463	.323	.356	.482	.440	.340	1.000	.463	.366	.542
	GSE08	.393	.319	.324	.451	.487	.485	.463	1.000	.547	.485
	GSE09	.388	.448	.379	.442	.380	.462	.366	.547	1.000	.474
	GSE10	.544	.351	.428	.562	.477	.460	.542	.485	.474	1.000

Table 131 - KMO and Bartlett's Test (GSE) - Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.913
Bartlett's Test of Sphericity	Approx. Chi-Square	823.117
	df	45
	Sig.	.000

Table 132 - Total Variance Explained (GSE) - Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.897	48.966	48.966	4.897	48.966	48.966
2	.839	8.393	57.359			
3	.755	7.554	64.913			
4	.658	6.580	71.493			
5	.646	6.458	77.951			
6	.590	5.901	83.852			
7	.473	4.728	88.580			
8	.410	4.096	92.676			
9	.386	3.858	96.534			
10	.347	3.466	100.000			

Extraction Method: Principal Component Analysis.

Table 133 - Scree Plot (GSE) - Factor Analysis

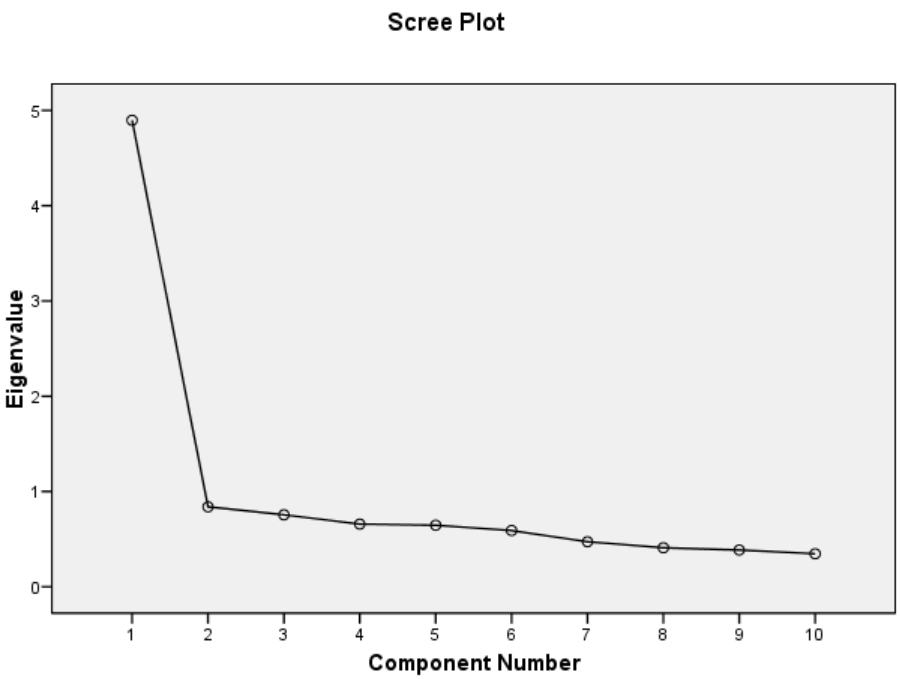

Table 134 - Component Matrix (GSE) - Factor Analysis

	Component
	1
GSE10	.771
GSE04	.765
GSE01	.723
GSE08	.712
GSE05	.703
GSE09	.697
GSE06	.697
GSE07	.685
GSE03	.634
GSE02	.590

Extraction Method: Principal Component Analysis.
a 1 components extracted.

12.1.7 Factor Analysis – CIFTER – Instrument Testing

Table 135 - Correlation Matrix (CIFTER) Factor Analysis

		CF1	CF2	CF3	CF4	CF5	CF6	CF7
Correlation	CF1	1.000	-.031	.000	.240	-.097	.363	.165
	CF2	-.031	1.000	.422	.371	.185	-.134	.295
	CF3	.000	.422	1.000	.458	.465	-.060	.523
	CF4	.240	.371	.458	1.000	.343	.009	.423
	CF5	-.097	.185	.465	.343	1.000	-.065	.434
	CF6	.363	-.134	-.060	.009	-.065	1.000	.148
	CF7	.165	.295	.523	.423	.434	.148	1.000

Table 136 - KMO and Bartlett's Test (CIFTER) Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.719
Bartlett's Test of Sphericity	Approx. Chi-Square	104.060
	df	21
	Sig.	.000

Table 137 - Total Variance Explained (CIFTER) Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.600	37.142	37.142	2.600	37.142	37.142
2	1.474	21.054	58.197	1.474	21.054	58.197
3	.884	12.627	70.824			
4	.670	9.567	80.390			
5	.502	7.170	87.560			
6	.446	6.373	93.933			
7	.425	6.067	100.000			

Extraction Method: Principal Component Analysis.

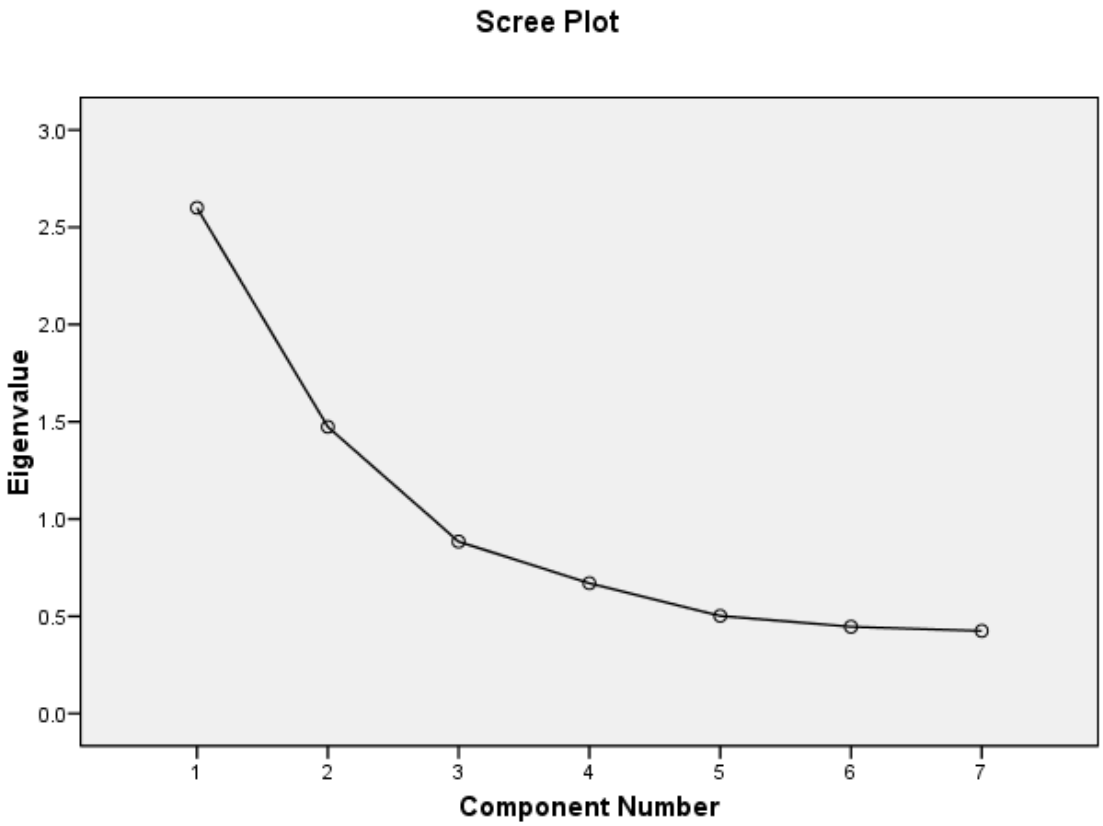

Figure 70 - Scree Plot (CIFTER) Factor Analysis

Table 138 - Component Matrix (CIFTER) Single Factor Model

	Component
	1
CF3	.811
CF7	.764
CF4	.736
CF5	.662
CF2	.600
CF1	.137
CF6	

Extraction Method: Principal Component Analysis.
a 1 components extracted.